EFFECTIVENESS OF PLANNED TEACHING PROGRAMME ON THE KNOWLEDGE AND PRACTICE REGARDING INFECTION CONTROL MEASURES FOR POSTOPERATIVE CARDIAC PATIENTS AMONG STAFF NURSES AT A SELECTED HOSPITAL, CHENNAI

Dissertation submitted to

THE TAMIL NADU Dr.M.G.R. MEDICAL UNIVERSITY

CHENNAI

In partial fulfilment of requirement for the degree of

MASTER OF SCIENCE IN NURSING

APRIL 2016

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STIJISAMUEL

LIST OF ABBREVIATION

MRSA	-	Methicillin-resistant Staphylococcus Aureus
ICU	-	Intensive Care Unit
CDC	-	Centre of Disease Control and Prevention
WHO	-	World Health Organization
CIPPM	-	Context, Input, Process, Product
SSI	-	Surgical Site Infection
CABG	-	Coronary Artery Bypass Graft
CLABSI	-	Central Line Associated Blood Stream Infection
CAUTI	-	Catheter Associated Urinary Tract Infection
HAI	-	Hospital Acquired Infection

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ABSTRACT

ABSTRACT

A study was conducted to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses at selected hospital in Chennai.

The objectives of the study were:

1. To assess the pre and post test level of knowledge and practice of infection control measures among staff nurses.
2. To correlate the level of knowledge and practice of staff nurses regarding infection control measures.
3. To assess the effectiveness of planned teaching programme on knowledge and practice of staff nurses regarding infection control measures.
4. To associate the mean differed level of knowledge and practice regarding infection control measures with selected demographic variables of staff nurses.

Methodology

The research approach used for the study was quantitative approach and the research design was pre experimental one group pre-test and post-test design. Forty samples were selected based on the sample selection criteria using non probability sampling technique. The study was conducted in Madras Medical Mission hospital, Chennai. Self administered questionnaire was used to assess the knowledge level and observational check list to assess the practice of staff nurses on infection control measures. The data was collected in three phases.

Findings

The overall pre-test level of knowledge revealed that 12(30%) had inadequate knowledge and 23(57.5%) had moderately adequate knowledge regarding infection control measures, and only 5(12.5%) of the samples falls under the category of adequate knowledge. The mean score of pre-test knowledge was found to be 16.47 with S.D of 4.57.Considering the practice the overall pre-test level of practice revealed that 36(90%) had inadequate practice, 4(10%) of the samples had moderately adequate practice and

none of them had adequate practice regarding infection control measures and the mean score of pre-test practice was found to be 12.75 with S.D of 2.59.

The overall post-test level of knowledge revealed that all 40(100%) had adequate knowledge and none of them had inadequate and moderately adequate knowledge regarding infection control measures. and the mean practice score in the post-test was found to be 29.92with S.D of 0.26. The overall post-test level of practice revealed that 11(27.5%) had moderately adequate practice and 29(72.5%) of the samples had adequate practice on infection control measures. The mean score of 30.70 with S.D of 4.13.

The calculated 'r' value was r = 0.351 which showed a moderately positive correlation between post-test knowledge and practice score which was found to be statistically significant at $p<0.001$.

The findings revealed that the pre-test mean score of knowledge was 16.47 with S.D of 4.57 whereas in the post test the mean score of knowledge was 29.92 with S.D of 0.26. The calculated paired 't' test value of t = 18.463 was found to be statistically significant at $p<0.001$ which proved high level of statistical significance. The findings revealed that the pre-test mean score of practice was 12.75 with S.D of 2.59 whereas in the post test the mean score of practice was 30.70 with S.D of 4.13. The calculated paired 't' test value of t = 23.76 was found to be statistically significant at $p<0.001$ which proved high level of statistical significance.

The findings revealed that there was no statistically significant association was found with demographic variables such as age, gender, educational level, duration of work experience and attendance at any class on infection control measures. The findings revealed that there was no statistically significant association found between the mean differed levels of practice and the demographic variables such as age, gender, educational level, duration of work experience and attendance at any class on infection control measures.

Conclusion

The study concluded that the planned educational programme was effective in improving knowledge and practice of infection control. It is help full to be more confident in their duty to reduce the infection.

INTRODUCTION

CHAPTER – 1

INTRODUCTION

1.1 BACK GROUND OF THE STUDY

Infection is the invasion of susceptible host by microorganisms and pathogens that will result in infectious diseases to the patients. There is an important difference present between infection and colonization. Colonization means the growth of microorganisms within the host without tissue invasion or damage (Tweeten 2009). Infection takes place, if the pathogen multiplies and alters the normal tissue functions. Some of the infections have low or no risk for transmission like viral meningitis and pneumonia. Such types of illness can be serious for the patients.

In a worldwide report of "the burden of health care associated infection" from 1995-2010 prevalence of infection was 7.6% in high income countries. Every year among 41,31,000 patients about 45,44,100 episodes of health care associated infections are seen in Europe. Prevalence of "health care associated infections" increases from 57% to 191%. Surgical site infections are higher in low and middle income countries. The incidence of surgical site infections ranges from 1.2 to 23.6 per 100 surgical procedures. In developed countries, "surgical site infection" varies between 1.2% to 5.2%. The infection rate of post operative patients may increase after the long term stay in the hospital. Several studies have reported that over 50% of "surgical site infections" have been manifested post discharges. Prevalence of ICU acquired infections ranged from 4.4% to 88.9% with the episodes of 42.7 per 1000 patients per day. The frequencies of ventilator associated pneumonia, central line associated infections are high in USA and Germany as compared to other countries.

From one person to another person, if an infection can be transmitted it is called communicable disease (Tweeten 2009). The pathogens can multiply and cause further signs and symptoms, the infection is called symptomatic. The clinical signs and symptoms may not be present; the illness is called as asymptomatic. The direct transmission of infection from skin to the blood from the percutaneous exposure, the source of infection is asymptomatic (CDC, 2010).

Critically ill ICU patients have invasive catheters, devices or they may undergo surgical treatment needed to improve the quality of care from the health workers. Adequate staff is necessary to perform a good quality care to the patient. Intensive care unit should be constructed in such a way so as to perform for daily activities and also the surface should be easy to clean near sink.

Inspite of serious efforts by infection control professionals, infection remain a major unwanted side effect of healthcare, it often causes serious harm to patients from the staff of the hospital. Hospital outbreak of infections is due to organisms such as salmonella, shigella, meningococcal and MRSA. As part of the control on the outbreak, the organisms may prompt a search for carriers among personnel. All over the world, gloves, gowns, mask, eye shields are ultimately the part of hospital biomedical waste after the usage. Infection is spreading through the health workers to patients, visitors to patients, worker to worker. Infection control studies suggest that health care workers are practicing only half of the precautions to prevent the infection. Each staff should follow the standards, policies, and protocols based on the CDC guidelines before carrying out the activities. Hospital acquired infection is spreading because of increased resistance of micro organisms to antimicrobials, prolonged hospital stay , factors related to infectious agents like virulence, antimicrobial resistance, the host, ICU admissions, invasive procedures, hospital devices used and hospital stay. A nurse should strengthen the patients to apply standard precautions when providing care to all the patients. The most important measure is to practice hand washing before touching the patient. The mask and goggles should be worn for potential splashes of blood and body fluids on the face.

US department of health and human services (2009) reported that all the hospital acquired infection in hospitals are more than 75% caused by four types of infections namely Urinary tract infection rate is (34%), surgical site infection rate (17%), blood stream infections (14%), ventilator associated pneumonia (13%).

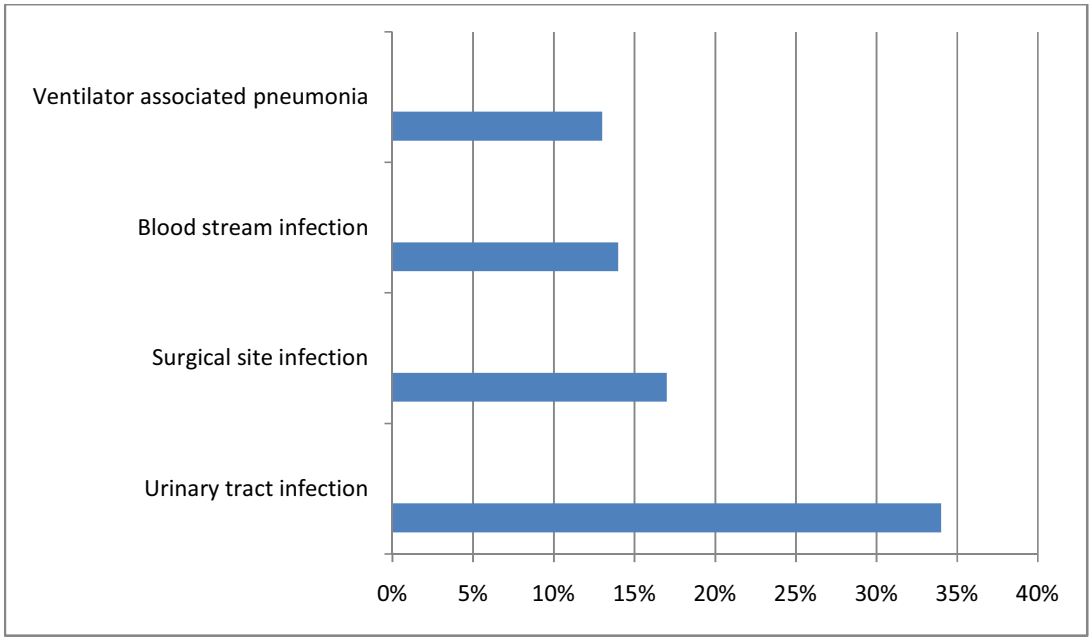

Fig.1: Percentage distribution of hospital acquired infection.

According to **CDC (2009)**, (5%) to (10%) of hospitalized patients develop hospital acquired infection. They estimated 99,000 deaths were identified in hospitals and 1.6 million to 3.8 million infections occurred in long term care facilities. In western Europe, the percentage of patients who develop hospital infection is similar to that in the United States. About 16 million added hospital days and 37,000 deaths are added each year in Europe because of hospital acquired infections.

Worldwide statistics of infections in post operative cardiac patients in 19th century Ignaz Semmelweis and Joseph Lister became the pioneers of infection control by introducing the surgical infections. The mortality rate of infections was 70-80%. The overall hospital acquired infections remained very high, that resulted in the burden of diseases. In 2007, the US centres for disease control estimated the cost of surgical site infections proved that the additional bed occupancy is the one relevant factor for infection. The economic burden of surgical site infections in Europe estimated the mean length of extended stay is 9.8 days.

Morbidity and mortality report of united states in central line associated blood stream infection(2008-2009) The CDC report based on 2013 data stated that 46 percent decrease in CLABSI between 2008 and 2013. A 19 percent decrease in SSIs

related to the 10 select procedures tracked in the report between 2008 and 2013. 6 percent increase in CAUTI between 2009 and 2013; although initial data from 2014 seem to indicate that these infections have started to decrease. 8 percent decrease in hospital-onset MRSA bacteremia between 2011 and 2013. A 10 percent decrease in hospital-onset clostridium difficile infections between 2011 and 2013. The 2009 calculations, stated that the CLABSI rate was multiplied by 0.817, yielding a rate of 3.64 CLABSIs per 1,000 central line-days

The rate of infections before the routine use of prophylactic antibiotics were 1-2% or less for common wounds, 6-9% for the clean contaminated wounds, 13-20% for the contaminated wounds and (40%) of infection present for dirty wounds. The United States national nosocomial infection surveillance system hospitals reported that clean wound was (2.1%), clean contaminated was (3.3%), contaminated was (6.4%) and dirty wound was (7.1%). The skin is having various types of bacteria. Staphylococcus aureus is the main bacteria which were affected around 50% in the skin. Evidence shows that the preoperative preparation with chlorhexidine was decreasing the bacteria on skin by 80-90%.

World Health Organization (WHO) (2009) estimated that surgical site infections develop in 2%-5% of the 16 million patients undergoing surgical procedures each year. (24%) of people were affected with nosocomial infections. The problems in developing countries aggravated where resources are scarce and also the shortage of staffs.

Based on the Indian statistical data **JY Batia (2009)** conducted a study about postoperative wound infection in patient undergoing coronary artery bypass graft surgery. The parameters of the study were age, sex, obesity, hypertension, diabetes, myocardial infarction, chronic renal failure, previous surgeries, alcohol consumption, smoking, length of pre and post operative hospital stay, antibiotic prophylaxis, MRSA screening and duration of surgery. Result revealed that 18.86% developed surgical site infections. 75% of people were affected with leg wound infections and forearm sites were 3.44%. Around 50% of cases needed to change the antibiotics during surgical site infections. The average cost of treatment for mild infection was 3.8%, moderate infection

was 14.7% and severe infection was 29.4%. The post operative hospital stay duration of patients developed with infection was higher.

Tweet (2011) conducted a study about the burden of infection in India. Around 190,000 deaths were found in each year due to sepsis. All India institute of medical science in New Delhi were found that 140 of 1,253 patients had nosocomial infections. In Goa, 493 patients in a tertiary hospital found that 103 peoples were affected nosocomial infections.

JY Bhathia (2006) surgical wound infection is one of the important cause of morbidity and mortality after the coronary artery bypass graft (CABG). The aim of the study was to identify the post operative wound infections. Results revealed that 615 patients participated in the study. 116(18.86%) of them developed surgical site infections (SSI). Sternum wound infection was 75%, leg infection was 21.3%. SSI reduced 50% of people with the help of antibiotics. 3.8% had mild infections, 14.7% had moderate infections and 29.4% had severe infections. The duration of increased hospital stay for post operative cardiac patients who developed infection was significantly higher. The length of increased hospital stay was 57% and cost of treatment was 42%. The study concluded that the overall rate of surgical site infection was 18.86% and the incidence of surgical site infection was between 2% to 20%. Around 75% of people had sterna site infection. The major pathogen for this study was staphylococcus epidemidis (42.24%) and staphylococcus aureus (15.5%). The other remaining infection was gram negative organisms (12.06%) and mixed infections (8.6%). 50% of people were affected with MRSA and 22.4% of them had severe infections.

Chen LF (2012) Outcome of infection in post operative infections following cardiac surgery results in major complications. Major post operative infections were identified in 341 patients out of 10,522 patients was 3.2%. Staphylococcus aureus were found in 52.5% of patients, gram negative bacilli were found in 24.3% and other pathogens were found in 23.2%. Mortality rate were more in patients with major post operative infection in cardiac patients. The percentage of mortality rate was 8.5%.

Kanafani (2009) conducted a study to assess the risk factors of post operative infections for staphylococcus aureus and chest wound infections after cardiac surgery

which results in significant morbidity and mortality. Results revealed that 1.3% of patients developed staphylococcus aureus blood stream or chest wound infections within 90 days after the cardiac surgery. There are more than 30 million major surgeries which were performed in hospitals each year in the United States of America. Approximately 6% of post operative complications increasing after the non cardiac surgeries and more than 30% of patients were getting high risk surgery infections. The most common complications after the cardiac surgery is surgical site infections.

The CDC healthcare-associated provided an updated national estimate of the overall problem of HAIs in U.S. hospitals. The survey found that on any given day, about **1 in 25** hospital patients has at least one healthcare-associated infection. There were an estimated **722,000** HAIs in U.S acute care hospitals in 2011. About **75,000** hospital patients with HAIs died during their hospitalizations.

1.2 SIGNIFICANCE OF THE STUDY

Mimox O, Villemineys, (2007) conducted a study to assess the efficiency of chlorhexidine – the alcohol based povidine iodine than the aqueous povidine iodine for skin infection at catheter sites. Before the insertion of central venous catheter into the jugular vein, the skin was disinfected with 5% povidine solution with 70% ethanol. The dressing changes every 72 hours. The result of the study revealed that povidine iodine, chlorhexidine based solution decreased 50% incidence of catheter colonization. The study concluded that chlorhexidine solution should be used as the replacement for povidine iodine formulations to prevent catheter associated infections.

Praveen Muthur (2010) conducted a study to assess the improper waste management which is generated in health care facilities .Exposure of biomedical waste management is having serious threat to the environment.

Fink.R (2012) conducted a study to assess the infection prevention practices among nurses by wearing gloves (97%, hand washing (89%) and the use of no touch insertion technique (73%). The study reported (4%) never using catheter securing device. Around (43%) of hospitals provided daily urethral meatus care. (64%) of hospitals provided the training programmes to the staff nurses for the aseptic techniques; moreover

only 56% of hospitals practice catheter associated urinary tract infection prevention practices.

CDC health care associated prevalence survey (2015) The current statistical data of overall hospital acquired infections in post operative cardiac patients on 2015 is very high. Hospital acquired infections after cardiac surgeries shows that less than 1% of septicaemia and deep sternal wound infection and less than 5% for pneumonia. In California, central line associated blood stream infection rate suggest that for acute critical care unit in 2013 was1.9% and in step down adult was 0.75% and post operative cardiac intensive care unit was 0.46%. The current CDC national and state health care associated report based on 2013 is, 46% decrease central line associated blood stream infection between 2008 and 2013. 19% decrease in surgical site infections. 10% increase in catheter associated urinary tract infection between 2009 and 2013.

Ioana Lola (2011) conducted a prospective study to assess the predisposing factors for post operative infections among 172 patients following open heart surgery. The aim of the study was to collect the risk factors of pre, intra and post operative variables for the development of nosocomial infections that underwent open heart surgery. Results revealed that infections occurred 24 (13.95%) out of 172 patients. 8 (4.65%) had superficial wound infections at the sternotomy site. 5 of them had (2.9%) central venous catheter infection, (2.32%) of patients had pneumonia, 9 (5.23%) of them had bacteremia, one patient (0.58%) had mediastinal infection and urinary tract infection. The mortality rate of infection was 25% among patients undergone cardiac surgery. The duration of mechanical ventilator was increasing the rate of infection among 67 (2.79%) and 11 (16.4%) patients had high risk infection due to readmission. The study concluded that the duration of long stay and readmission are the independent risk factors of infection for the postoperative cardiac surgical patients. Patient with diabetic mellitus is 5.9 times higher the risk of acquiring infection and increased 30% for everyday on mechanical ventilation, 8.6 times higher in patients who is readmitted to the intensive care unit.

During my postings across different hospitals researcher came across certain practices among all paramedics that were in fact contributing a great deal to the

prevalence of infection among patients. This made the researcher streamline the topic to assess the practice among nurses caring for post operative cardiac patients as the major cause of infection post operatively. It was due to infection acquired during their stay post operatively. Certain practices observed from the paramedics caring post operative patients were really alarming and I really wanted to assess whether these practices were because of their lack of knowledge on infection control measures or was it of their poor attitude towards it. This made me undertake this study to assess the effectiveness of knowledge and practices regarding infection control measures for post operative cardiac patients among staff nurses at selected hospital Chennai.

1.3 STATEMENT OF THE PROBLEM

An experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses at selected hospital in Chennai.

1.4 OBJECTIVE OF THE STUDY

1. To assess the pre and post test level of knowledge and practice of infection control measures among staff nurses.
2. To correlate the level of knowledge and practice of staff nurses regarding infection control measures.
3. To assess the effectiveness of planned teaching programme on knowledge and practice of staff nurses regarding infection control measures.
4. To associate the mean differed level of knowledge and practice regarding infection control measures with selected demographic variables of staff nurses.

1.5 OPERATIONAL DEFINITION

Effectiveness

It refers to the extent to which the planned teaching programme on infection control measures for post operative cardiac patients has brought changes in the level of knowledge and practice of staff nurses which was elicited by Self administered questionnaire and Nurses Performance Observational check list.

Planned Teaching Programme

It is an educational package which was designed by the investigator to enhance the knowledge and practice of staff nurses regarding infection control measures which included hand hygienic practices, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, surgical site infection, catheter associated urinary tract infection and biomedical waste management by using various methods of teaching such as lecture, demonstration and exhibition.

Knowledge

It refers to awareness and understanding of staff nurses regarding infection control measures of post operative patients which was measured by using self administered questionnaire.

Practice

It refers to the skills of the staff nurses in performing the routine activities and standard precautions to prevent and control the infection of the post operative cardiac patients which will be assessed by nurse's performance observational check list.

Infection Control Measures

The routine activities and procedures to be carried out by the staff nurses to prevent the infection among post operative cardiac patients which included hand hygienic practice, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, surgical site infection, catheter associated urinary tract infection and biomedical waste management

Post operative cardiac patients

Post operative cardiac patients who have undergone cardiac surgeries at Madras Medical Mission Hospital.

Staff Nurses

A registered nurse with diploma, degree or PG qualifications working in the post operative cardiac care unit with less than 1 year of experience.

1.6 HYPOTHESES

NH_1- There is no significant difference between pre and post level of knowledge and practice regarding infection control measures among staff nurses.

NH_2- There is no significant relationship between post test knowledge and practice on infection control measures among staff nurses.

NH_3- There is no significant association of mean differed knowledge and practice with selected demographic variables of staff nurses.

1.7 ASSUMPTION

1. Post operative cardiac patients are prone to get infection.
2. Staff nurses are with the patients round the clock and they need to be updated with continuous education and practical skills on infection control measures.

1.8 DELIMITATION

This study was delimited to the period of 4 weeks

1.9 CONCEPTUAL FRAMEWORK

Conceptual frame work adopted for this study is based on the Context, Input, Process, Product (CIPP) evaluation model and Kirkpatrick's learning evaluation model. Context Input Process Product evaluation model was developed by Daniel L Stuffle Beam in 1996 and further updated throughout the years with update 2002. It is a comprehensive frame work for guiding evaluation of programmes, project, personnel, products and systems.

Kirk Patricks learning evaluation model was developed by Donald L Kirk Patrick in 1954 and was published in his book in 1994. It demonstrates evaluating the effectiveness of training programme in a sequence of steps.

GENERAL CONCEPTS OF CONTEXT INPUT PROCESS PRODUCT (CIPP) EVALUATION MODEL.

Context input process product evaluation model is applied to educational and training programmes

Context: (what needs to be done?)

The context input process product evaluation model establishes the goals of the programme. At this stage, the needs of the beneficiaries are identified.

Input: (How it should be done)

The suitable strategies of the programme execution are identified.

Process: (Is it being done)

The execution of the training programme is observed.

Product: (Did it succeed)

Product measures the outcome, the impact and react of the training programme and its effectiveness to fulfil the objectives.

GENERAL CONCEPTS OF THE KIRK PATRICK'S LEARNING EVALUATION MODEL

Level-1(reaction)

To what degree participants react favourable to learning environment and what they think and feel.

Level-2 (learning)

To what degree participants acquire the intended knowledge, skills and attitudes based on their participation in the learning environment.

Level-3 (behaviour)

To what degree participants apply, what they have learnt when they are back on the job

Level-4 (results)

To what degree predetermined targeted outcomes occurs as results of learning events.

APPLICATION OF INTEGRATED CONTEXT INPUT PROCESS PRODUCT EVALUATION MODEL AND KIRKPATRICKS LEARNING EVALUATION MODEL FOR THE PRESENT STUDY

Context and reaction

It comprises the concept of context from CIPP model and reaction from Kirk Patrick's model. Here the researcher assess the demographic characteristics of nurses and obtains informed consent to participate in this study.

The researcher also assess the pre-test level of knowledge as part of the learning and pre-test level of practice as part of the behaviour in the concepts by means of self administration questionnaire and nurses performance observational check list respectively. Here the researcher identifies the learning needs of staff nurses regarding the infection control measures and establishes the goals of the programme.

Input and process

It comprises of input and process from CIPP model and learning and behaviour from Kirk Patrick evaluation model. Here after identifying the learning needs, the nurse researcher develops the planned teaching programme which comprises of

- Information transfer
- Demonstration
- Exhibition

After the validation of the planned teaching programme the same was administered for the staff nurses. During this process the staff nurses learnt the aspects of infection control and changes in their behaviour (practice) takes place.

Product and result

The concept of product from CIPP model and the result from kirk Patricks model was integrated. Here the nurse researcher evaluates to what degree the staff nurses acquired the intended knowledge (learning) and practice (behaviour) in the post test after the planned teaching programme.

If the learning (knowledge) and behaviour (practice) is adequate, they will be subjected to enhancement and if it is inadequate or moderately adequate they will be subjected to reinforcement.

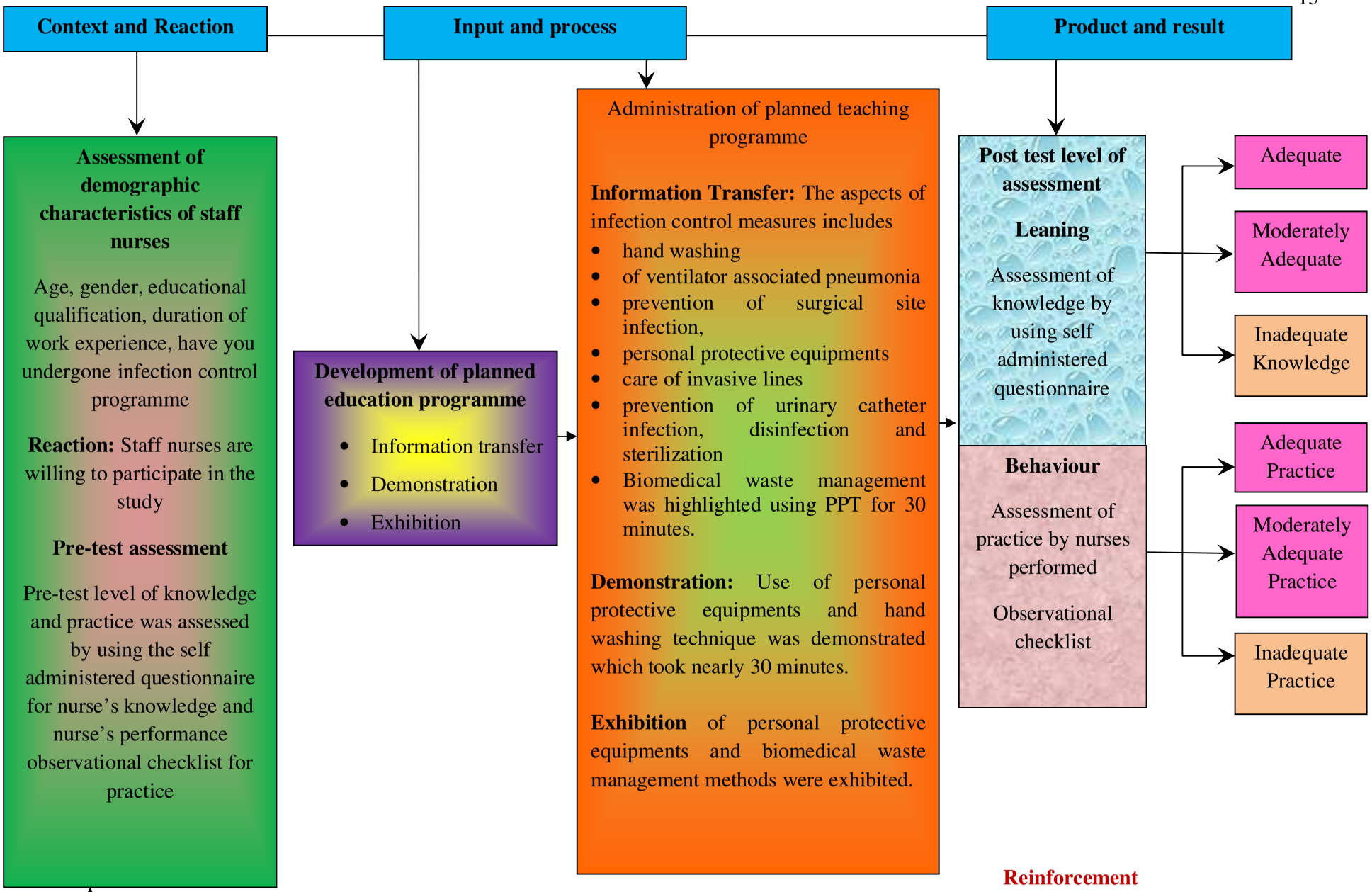

Fig.1.9.1: Conceptual framework based on Context, Input, Process, Product and Kirk Patrick's Learning Evaluation Model

REVIEW OF LITERATURE

CHAPTER – 2

REVIEW OF LITERATURE

A review of related literature enables one to get an insight into the various aspects of the problem under study. It covers aspects of the problem promising methodological tools, throws light on ways to improve the efficiency of the data collection and suggestions. How to improve or increase the effectiveness of data analysis and interpretation. Review of literature is therefore an essential step in the development of the research project.

The literature review of this chapter is to present a critical appraisal of the literature to determine the knowledge of nurses to provide a quality care and practices of infection control measures. A literature search was conducted using Pubmed, CINAHL, Medline, for nursing research articles utilizing key search terms of hand hygiene, personnel protective equipments, ventilator associated pneumonia catheter associated UTI prevention practices, surgical site infection prevention practices, care of invasive line practices and biomedical waste management practices.

The review of literature is divided in to two parts

2.1 Part I Literature related to prevalence of infection among post operative cardiac patients.

2.2 Part II Literature related to various infection control measures for post operative cardiac patients.

2.3 Part III Literature related to knowledge and practice on infection control measures among staff nurses

2.1 Part I- Literature related to prevalence of infection among post operative cardiac patients.

Lee MB, Greig GD (2013) conducted a study to review the nosocomial salmonella out breaks. The aim of the study was to identify the mode of transmission morbidity and mortality patterns. Sample size of the study was 52. Results revealed that most frequent route of transmission was through food. Improving good food practices

may reduce the nosocomial infections. Outbreaks from the hospitals mostly from food borne.

Jonkers (2006) conducted a study to assess the prevalence of post operative wound infection among 1885 patients who had undergone the cardiac surgery. The data was collected from the medical records, bacteriological results and systemic observation by infection control nurses and from the help of out- patient clinic. Findings revealed that 4.7% of patients were diagnosed to have surgical wound infections during 30 days of hospitalization. The study concluded that long stay of patients in hospital will improve the nosocomial infections.

Kawalec A (2014) conducted a study to assess the compliance with the hygiene procedure among 112 medical faculty students by using the anonymous survey. The components of survey included the frequency of disinfection on hands and stethoscope, changing clothes into clean ones, compliances with recommendations for health care workers and subjective assessment of disinfectants in the hospital. Results revealed that 35.7% of students did not disinfect their hands before each patient examination. The study concluded that students with hand hygiene now and the future work provide easy method to prevent the infection.

Kollef MH (2006) conducted a prospective cohort study to assess the impact of nosocomial infections on 605 patients outcome following cardiac surgery in barnes-jewish hospital. The aim of the study was to evaluate the relationship between the nosocomial infections and clinical outcomes following cardiac surgery and to identify the risk factors for the development of nosocomial infections. The result revealed that 131 (21.7%) patients acquired nosocomial infection following cardiothoracic surgery. 5% of patients were died during their hospitalization. Mortality rate of hospital acquired infection for patients (11.5%) was significantly greater than the mortality rate of patients not having nosocomial infection (3.2%). The study concluded that reducing the hospital stay can prevent the nosocomial infections following cardiac surgery and can subtatially improve the patient outcomes.

2.2 Part II- Literature related to infection control measures.

Alice Park (2013) conducted a study to assess the use of gloves and gowns by the visitors to stop the spread of infection among 26,000 patients in intensive care unit. The aim of the study was to collect the swabs from the patients to find the MRSA infection. Results revealed that 40% of MRSA infections dropped down by the use of universal precautions. The study concluded that wearing gown and gloves by the health care workers can prevent the nosocomial infections.

Seibert DJ (2014) conducted a cross sectional study to assess the knowledge, perception, and practice prevention of MRSA transmission with the use of gloves and gown among 276 medical, nursing, allied health and support service staff in acute care settings. Results revealed that hand hygiene, gowning and gloving found lower rate of adherence among the health care workers. The study concluded that improvement of knowledge can prevent the infections.

Tomas ME (2015) conducted a quasi experimental study to assess the prevalence of contamination of health care personnel during the removal of personal protective equipments among 435 samples. The aim of the study was to determine the frequency and site of contamination on the skin with the removal of personal protective equipments. Results revealed that 52.9% of them had contamination during the removal of gloves and gowns. The study concluded that practice of frequent use of gloves and gowns reduce the risk of contamination during the removal of personal protective equipments.

Kilinc Balci (2015) conducted a study to assess the use of isolation gowns in health care settings. Results revealed that personal protective equipments prevent the transmission of infectious disease in certain settings. The study concluded that health care workers have lack of knowledge about the performance of personal protective equipments.

Roghmann MC (2015) conducted an observational study to assess the transmission of MRSA to gowns and gloves among 403 health care workers. Results revealed that 113 health workers found MRSA. 24% of health care workers had glove

contamination than the gown contamination. The study concluded that more contact with the infected materials increase the risk of infection.

Guo YP (2014) conducted a study to assess the rate of contamination during the removal of personal protective equipments among 50 participants. Results revealed that nurses and senior staff nurses had contamination while removing their gloves, gown and shoes. Video demonstration of CDC guidelines was shown to the nurses. the study concluded that the effect of gown, glove removal, discarding personal protective equipments should be done carefully can prevent the infections.

Jayaraman SP (2014) conducted a prospective study to assess the hand hygienic compliances does not predict the rate of resistant infections among 1000 critically ill patients, tracked in monthly audit and anonymous observers, was from an infection control database. The data were collected before 6 months and after 12 months of 2011 outbreak of multi drug resistant acenitobacter in the surgical intensive care units. The findings revealed that the median rate was 100% before and 97.6% was after the outbreak, p=0.93. In none of the ICU rate of hand hygienic compliance there is increase in response to the outbreak of multi drug resistant acenitobacter. The study concluded that infection control tactics other than hand hygienic compliance play a crucial role in preventing the transmission of nosocomial infections.

Macintyre CR (2015) conducted a randomised clinical trial study to assess the prevention of health care infections. Face mask was recommended to prevent transmission of droplets and respirators for respiratory aerosols. The clinical practice enriched the concepts of droplets and airborne transmission recently shown to be more complex than previously thought. In the health care settings, the face mask were used for the protection of respiratory system. The result revealed that the face mask and hand hygiene can prevent the respiratory associated infections.

Mischike C Verbeek JH (2014) conducted a randomised control trial study to assess the prevention of injuries and infections by wearing the gloves or extra gloves by health personnel. The aim of the study was to assess the benefits and harms of wearing gloves during procedures. 34 randomised control trials participated out of 6890 participants and they reported 46 intervention control trials. Check list were used to

assess the staff nurses. The study concluded that the use of double glove can prevent the infections.

Ganczak M, Szych Z (2007) conducted a survey study to evaluate the self reported compliance about personal protective equipment among 601 surgical nurses from randomly select hospital in urban and rural area by using confidential questionnaire. the results revealed that not only the compliance was high for glove use (83%) but also lower for protective eye wear (9%) and only 5% of them were using routinely gloves, mask, protective eye wear and gowns while doing procedures. 37% of nurses complained about the non- availability of personal protective equipments. The study concluded that wider implementation, evaluation and training programmes will improve the practice of using personal protective equipments.

Chia SE (2005) conducted a study to assess the use of personal protective equipment among 14,554 health care workers in public health care sector hospitals and primary health care poly clinics during the outbreak of sever acute respiratory syndrome (SARS) by using self administered questionnaire. Results revealed that 70.3% of doctors and nurses were responded. Around 32.5% of doctors, 48.7% of nurses and 77.1% of administrative staff answered that surgical mask is useful to protect the severe acute respiratory syndrome. The study concluded that the use of face mask can able to prevent the respiratory infections.

Picheansanthian (2015) conducted a quasi experimental and descriptive study to assess the prevention of transmitting infection with the utilization of gloves by the health workers. The aim of the study was to evaluate the clinical use of glove in the prevention of cross infection. The results revealed that the gloves were overused and misused by the health care workers. The use of gloves by the health care workers is less. The study concluded that gloving can reduce the contamination of hands.

2.3 Part III- Literature related to knowledge and practice on infection control measures among staff nurses

Tartari E (2011) conducted a study to assess the pre-educational intervention survey of health care practitioner's compliance with infection control measures in cardiothoracic surgery. They used a structured observational method to collect the data

about infection control practices for 155 healthcare practitioners. Findings revealed that inadequate practices of infection measures related to environmental disinfection and hand hygiene increases the rate of superficial and deep surgical site infections by 16.4% including both sterna and harvest site infections. The study concluded that poor practices of infection control by non scrubbed personnel in cardiac surgery resulted in high surgical site infection rates.

Wilson M, Wilde M, Web ML (2012) conducted a study to assess the prevention of catheter associated urinary tract infection with long and short term indwelling catheters. The aim was to prevent the complications of indwelling catheters and to give education to the staff for the catheter use, insertion of catheters, catheter care, securement, closed drainage system use, irrigation of bladder, frequency of changing the catheters and use of antiseptic solutions in the drainage bags. The study results revealed that routine changes of catheter in every 6^{th} day reduce catheter associated urinary tract infection. Use of sterile techniques, antiseptic solutions, during catheter care reduces the urinary tract infection. The study concluded that catheter associated urinary tract infection control training program is an essential element to prevent the infection among staff.

Beggs CB, shepherd SJ (2008) conducted a study to assess the frequency of increasing hand washing by the staff to commensurate reductions in staphylococcal infections in the hospital. The aim of the study was to assess the improper hand hygiene which can lead to staphylococcal infection. Result revealed that 50% people were doing improper hand hygienic practices. The study concluded that hand hygiene is an effective control measures.

Koutzavekiaris, (2011) conducted a study to assess the knowledge and practice of staff nurses to prevent the central venous catheter infection by using questionnaire and observational checklist among 345 nurses. The aim of the study was to conduct the survey on theoretical knowledge and practice of intensive care unit nursing staff about central venous catheter related infections. 13.6% of staff answered all questions correctly. 40% had been trained for central venous catheter related infections. The practice of central venous catheter care of staff nurse being higher scores on the part of

maintenance. The study concluded that there is a need for increasing the knowledge and practice of staff nurses working in intensive care unit.

Mimoz, Moreira R (2010) conducted a study to assess the practice of central venous line care in surgical intensive care unit among 124 nurses by using questionnaire. The aim of the study was to identify the knowledge and application by nurses in French university hospital intensive care units. Forty one senior nurses and 53 juniors were answered. Result revealed that 10% answered to change the central venous dressing every day,49% answered every 2 days, 29% were answered every 4^{th} day by using same antiseptic solutions.78% answered to use semi-permeable transparent dressing. 32% of them said to change the catheter line after the administration of blood products. The study concluded that the maintenance of central venous catheter insertion is not still known to the people.

Hatler C, Buckwald L (2009) conducted an exploratory study to assess the knowledge and practice of central venous catheter care in intensive care unit. The aim of the study was to evaluate the evidence based practice in care of central venous catheter and the knowledge of infection control practices. The researcher selected convenience sample to collect the data. Result revealed that few of the transparent dressing and chlorhexidine dressing is used to prevent the infection.

Haycock C (2006) conducted a retrospective study to assess the implementation of evidence based practice findings to decrease postoperative sternal wound infections following open heart surgery. The objective of the study was to decrease the preoperative and postoperative incidence of sternal wound infections by the examination and changes of current practices undergoing open heart surgery. Peer education programme conducted to the staff nurses. Findings revealed that the absence of common causative organisms following the implementation of evidence based practice changes. The study concluded that the outcomes enhanced when nurses collaborate with all stakeholders in the practice improvement initiative.

Weltering R (2011) conducted a study to assess the hospital hygiene skills of 184 physicians and staff nurses by using structured questionnaire and observational checklist. Findings revealed that 7 out of 10 knowledge questions were answered about

hand hygiene. 74% of persons were demonstrated proper hand hygiene and 66% of persons were not wearing any jewellery on their hands. There was no significant difference present between nurses and physicians. The study concluded that the application of the method provided additional information on hand hygiene skills of their staff members.

Hautemaniere A (2010) conducted a direct observational prospective study to assess the factors associated with poor hand hygiene of hospital workers using an alcohol based hand gel and the effect of an education programme among 3067 professional nurses. Findings revealed that the effectiveness of hand hygiene were highly associated and wearing rings , bracelets, watch , long nails were associated with ineffective hand rub use. The study concluded that educational programmes can significantly improve in using hand rub and hand washing compliance.

Maheshwari V (2014) conducted a cross sectional study to assess the knowledge and attitude regarding hand hygiene among 160 residents and nursing staff to identify the areas of gaps in their knowledge and attitude in a tertiary health care settings of Bhopal city. Results revealed that significant difference was observed regarding most frequent source of germs responsible for health care associated infections among residents and nurses. The study concluded that repeated training needs regarding the hand hygiene practice among residents and nurses to provide current knowledge in the area of behavioural changes and practices leading to reduce the nosocomial infections.

Abd Elaziz KM (2009) conducted a cross sectional descriptive and observational study to assess the knowledge, attitude and practice of hand washing among 2189 health care workers by using self administered questionnaire. The study was conducted for 6 months. The findings revealed that having a short contact time and improper drying were the most common errors that lead to improper hand washing and the mean score of knowledge was more higher in nurses than the doctors. Concluded that most of the nurses believed that administrative orders and continuous observation can improve hand washing practices and also institutional support is important to improve the practices.

Sodhi K (2013) conducted a study to assess the knowledge of infection control practices among 100 intensive care nurses in a tertiary hospital the data was collected by

self administered questionnaire. The result revealed that the overall knowledge and awareness regarding infection control practices were excellent. The study concluded that the infection control knowledge among the nurses was good and there is still need for a wide scope of improvement with regular educational programs.

Aiello (2009) conducted a cross sectional survey to assess the knowledge, beliefs, perceptions on hand hygiene practices among 392 nurses by using questionnaire. The findings revealed that positive perceptions, beliefs regarding the effectiveness of infection control in nursing homes were reported appropriate glove use is necessary after the hand washing. The study concluded that in-service educational programme is necessary in nursing homes to prevent the surgical site infections.

Nair (2014) conducted a cross sectional study to assess the knowledge, attitude and practice of hand hygiene among 98 medical and 46 nursing students in tertiary health care centre by using self structured questionnaire. Results revealed that 9% of participants had good knowledge on hand hygiene. The study concluded that nursing students knowledge and practices were significantly higher than the medical students.

Patarakul K (2005) conducted a cross sectional study to assess the hand hygiene compliance and attitude of health care workers and visitors in the intensive care units by using self administered questionnaire for two week period. The results revealed that overall hand hygiene compliance obtained from the study was less than 50%. The study concluded that the knowledge, attitude and beliefs of health care workers and visitors hand hygiene compliance had to be improved.

Ho SE (2013) conducted a descriptive cross sectional study to assess the nurses to measure the knowledge and compliance about the hand hygiene among 84 registered nurses from intensive care unit by using the self administered questionnaire. The findings revealed that there were no significant differences between knowledge and hand hygiene compliances. The study concluded that nurse's compliances to hand hygiene practice and knowledge was good. High motivation is required for infection control team to improve the hand hygienic practices.

Acharya A.S (2013) conducted a cross sectional study to assess the knowledge and practice of standard precautions for infection control among 293 nurses in a tertiary hospital by a semi structured questionnaire. The result revealed that 97.9% of nurses had poor knowledge on standard precautions and 189(64.5% of nurses had inadequate knowledge on transfusion of blood borne pathogens, 58.7% used gowns and gloves very often during the procedure. The study concluded that major gaps present between the knowledge and practices of nurses regarding standard precautions.

Suchitra JB (2007) conducted an experimental study to assess the impact of knowledge, attitude and practice of nosocomial infection among 150 health care workers by using self administered questionnaire. The results revealed that nurses had poor knowledge during pre-test. Education programme given to the staff. The study concluded that education has a positive impact on knowledge, attitude and practice.

Allegranzi B (2013) conducted a quasi experimental study to assess the global implementation of multimodal strategy for the improvement of hand hygiene among 21884 health care workers 5 countries by using questionnaire. Results revealed that health care workers knowledge improved after the educational programme. The study concluded that educational programme is needed for the health care workers in between their job.

Nicolosi LN (2014) conducted a quasi experimental study to assess the effectiveness of oral hygiene and 0.12% chlorhexidine gluconate oral rinse in preventing ventilator associated pneumonia after cardiovascular surgery. Each group consisted of 150 patients. The findings revealed that no significant difference were observed between two groups. The risk of developing pneumonia after the surgery is high in control group. The study concluded that oral hygiene and use of chlorhexidine is effective in reducing the incidence of ventilator associated pneumonia.

Murray MT (2013) conducted a retrospective cohort study of patients undergoing cardiac surgery to assess the surgical site infections and blood stream infections among 552 cardiac surgical procedures through the observational tool. The aim of the study was to assess the risk factors and epidemiology of surgical site infections and blood stream infections. Findings revealed that overall 8.7% of surgical

procedures were complicated by surgical site infections and blood stream infections. Improper timing of antibiotics and excessive bleeding within the time of 24 hours of surgery to be significant predictors for surgical site infections. Extending the duration of arterial lines to be significant predictor for blood stream infections. The study concluded that surgical site infections and blood stream infections are the important complications after cardiac surgery in patients.

Arrowsmith VA, Taylor (2014) conducted a randomised control trials study to assess the effect of presence and absence of nail polish and finger rings in surgical scrub nurses on post operative wound infection among 102 staff nurses by using check list. Result of the study revealed that nail polish and finger rings used to spread bacteria to the patients during pre operative, intra operative and post operative care.

Schwebel C, Lucet (2012) conducted a study to assess the effectiveness of chlorhexidine impregnated sponges in prevention of catheter related infections in critically ill adults. The aim of the study was to assess the cost benefits of chlorhexidine impregnated sponge use. The researcher used randomised two way factorial dressing study for 1636 patients. The study showed that a chlorhexidine decreased the incidence of major catheter related infections. The result revealed that chlorhexidine impregnated sponge prevents the catheter related infections.

Mimoz O, Villeminey S (2007) conducted a study to assess the use of chlorhexidine and alcohol based povidine-iodine for central venous catheter care among 538 random sample. Before catheter insertion, solutions were used for skin disinfection. Results revealed that 481 samples produced culture results which is compared to povidine iodine solution. The study concluded that the use of povidine iodine prevents catheter associated infections.

Huis A (2012) conducted a cluster randomised control trial study to assess the impact of a team and leaders-directed strategy to improve nurses adherence to hand hygiene among 2733 nurses in Netherlands. Observation tool used to assess the routine before and after care of patients. The analyses were done by using linear modelling techniques. Findings revealed that hand hygiene compliance in the team and leaders directed group were improved 53% in the short term. The study concluded that they

added the value of social influence and leadership in hand hygiene improvement strategies and also promised for improving team performance with other patient safety.

Anargh V (2013) conducted a cross sectional study to assess the hand hygiene practices among 100 health care workers in a tertiary care facilities by using questionnaire. Findings revealed that the knowledge about hand hygiene practices was 85% and 73% of health care workers believed that unclean hands are important route for the transmission of organisms. 21% of health care workers were missing the hand washing opportunities due to heavy work load, non availability, and inaccessibility of hand hygiene facilities which were the common reasons for non compliance and the availability of paper towel were low. The study concluded that improper hand wahsing by alcohol based rubs was very high.

Galal YS (2014) conducted a study to assess the impact of infection control programme on knowledge, attitude and practice among 125 nurses in intensive care units at Cairo University hospitals by using a self administered pretest questionnaire and observational check list. Interventions given included health education sessions in the form of powerpoint and video presentations and post test were done. Findings revealed that a significantly higher level of knowledge present after post-test compared to pre-test. The study concluded that educational programme improves the nurses knowledge, attitude and practice.

Akyol (2007) conducted a study to assess the hand hygiene among 129 nurses in Turkey by using questionnaire for knowledge and Fulkerson scale for practice of hand washing. The aim of the study was to identify the practices and opinion on hand hygiene. The results revealed that the nurses have poor level of knowledge about the quality of hand washing and not able to do hand washing due to heavy work. The study concluded that the nurses should improve their knowledge and practices to prevent the infection.

Creedon (2006) conducted a quasi experimental study to assess the attitude, beliefs and knowledge of hand hygienic practices among 314 nurses, physiotherapist, doctors by using questionnaire and observational checklist. Findings revealed that out of 51samples, 83% of knowledge was improved in hand washing. The study concluded that alcohol hand rub need to be provided at each patient bedside.

Silva (2014) conducted a descriptive correlational and cross-sectional study to assess the practice of hand hygiene among nurses, operating assistance by using questionnaire. Aim of the study was to assess the practices of hand washing. The findings revealed that 43.7% of samples reported less knowledge on practice of hand washing technique.38% of nurses reported improper steps of hand washing and 43% of them were not practicing hand washing on time. The study concluded that most of them have not only good knowledge regarding the hand washing but also to improve the practice of hand washing on time.

Salama MF (2014) conducted an interventional study to assess the effect of hand hygiene compliances on hospital acquired infections among staff nurses by using WHO hand hygiene protocol before and after hand hygiene in an ICU setting in a Kuwait. The results revealed that the overall rate of hand hygiene compliance by all the health care workers increased from 42.9% pre-intervention to 61.4% post intervention. The rate of blood stream infections decreases from 18.6 to 3.4 per 1000 central line. The rate of lower respiratory infections reduced from 17.6 to 5.2 per 1000 ventilators. The study concluded that infection control programme can improve the hand hygiene practices.

Mathai AS (2011) conducted a prospective observational study to assess the efficacy of teaching for the improvement of hand hygiene compliance among nurses in a tertiary level intensive care unit by using self administered questionnaire and check list. Results revealed that most common reason for improper hand hygiene is lack of time (37%) and also the nurses shows significant improvement for hand washing after the intervention. The study concluded that teaching strategy can be useful for the improvement of hand hygiene.

Nouira A, Ounis H (2008) conducted an experimental study to determine the evolution of hand washing rates among nurses in intensive care unit by using an observational checklist. Results revealed that time is the problem for recontamination of the hands and 34% to 47.5% of nurses were not doing the hand washing on time. The study concluded that hand washing should improve in nurses to prevent the infection.

Tschudin Sutter S (2010) conducted a study to assess the hand hygiene in the intensive care unit. Result revealed based on the centres for disease control and prevention and world health organization guidelines on hand hygiene should be used alcohol based hand rub as the preferred means for routine hand antiseptics. Nurses have lack of knowledge regarding hand hygiene and risk of cross transmission of pathogens is barriers to good hand hygiene practices. The study concluded that increased use of hand rub for hand washing can prevent the nosocomial infection.

Kumar R, Samrongthong R (2013) conducted a quasi-experimental study to assess the knowledge, attitude, and practice of health regarding the disposal of waste among 275 nurses at tertiary Care in metropolitan city of Pakistan by using self administered questionnaire. Findings revealed that the infectious waste disposal practices in hospital were not statistically significant. Doctors and nurses have good knowledge and practice regarding disposal of waste compared to paramedical and other sanitary staff. The study concluded that practices regarding infection control among health workers were not found up to the standards and also not following the CDC guidelines and rules of WHO.

Mahfouz AA, E Gamal (2013) conducted a direct observational study to measure the compliance of hand hygiene practice among 536 nurses in intensive care unit of Aseer central hospital by using standardized world health organization method for direct observation " five moments of hand hygiene" approach. Findings revealed that the overall hand hygiene non compliance was observed in 41%. The study concluded that education can improve the hand hygiene skills to prevent the nosocomial infection.

Ramon (2011) conducted a study to evaluate the quality of hand hygienic technique among health care workers and the influence of wearing jewellery among 293 health professionals on different shifts which studied with the fluorescent agent that allowed to determine the areas of contact with the solution. Findings revealed that in the fingers , thumbs, wrists were significantly lower than those obtained in other areas of the hand, being dirty in over 50% of the participants. The study concluded that the health care workers were not properly applying the technique of hand hygiene effectively.

METHODOLOGY

CHAPTER – 3

RESEARCH METHODOLOGY

This chapter deals with the methodology adopted for the study. It includes design, setting, population, sample, sampling technique, and criteria for sample collection, tools and techniques for data collection, content validity of the tools, pilot study, and plan for data analysis.

3.1 RESEARCH APPROACH

The research approach used for the study was quantitative research approach

3.2 RESEARCH DESIGN

The research design used for the study was pre-experimental one group pre test and post test design.

Day 1	Day 1	Day 7
O_1	×	O_2
Pre-test	Intervention	Post-test

3.3 VARIABLES OF THE STUDY

3.3.1 Independent Variables

Planned teaching programme on infection control measures.

3.3.2 Dependent Variables

Knowledge and practices regarding infection control measures.

3.3.3 Demographic Variables

Age, gender, education, duration of work experience, attendance of training programmes about infection control.

3.4 RESEARCH SETTINGS

The study was conducted at Madras Medical Mission Hospital Mogappair Chennai, which is a Cardiac speciality hospital with 281 beds and 25 post operative

cardiac care beds to provide intensive care to patients after surgery. The study was conducted in post operative Cardiac care unit of MMM hospital.

3.5 POPULATION

3.5.1 Target Population

Staff nurses working in cardiac post operative intensive care units of Tamilnadu were the target population.

3.5.2 Accessible Population

Staff nurses working in post operative cardiac care unit of MMM.

3.6 SAMPLE

Staff nurses who fulfilled the sample selection criteria.

3.7 SAMPLE SIZE

Sample size of the study was 40

3.8 SAMPLING TECHNIQUE

Sampling technique used by the investigator was non probability convenience sampling technique

3.9 CRITERIA FOR SAMPLE SELECTION

3.9.1 Inclusion Criteria

Nurses who were having less than 1 year of experience.

3.9.2 Exclusion Criteria

Nurses who have undergone intensive training on infection control measures.

3.10 DEVELOPMENT AND DESCRIPTION OF THE TOOL

The tool consisted of two sections

3.10a: Section A: Assessment tool

The tool was developed after a thorough review of literature, opinion from experts and from personal experience. The assessment tool used for data collection was a self

administered questionnaire to assess the knowledge level and nurses performance observational check list to assess the practice level of staff nurses on infection control.

The assessment tool for data collection consists of three parts.

Part I- Demographic variables which include Age, gender, education, duration of work experience, attendance of training programmes about infection control measures.

Part II- Self administered questionnaire to assess the knowledge of the staff nurses, regarding infection control measures. It consisted of 30 questions which included the following aspects such as general information on infection, hand washing, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, prevention of surgical site infection, prevention of urinary catheter infection, disinfection and sterilization, biomedical waste management.

Part III- Nurses performance observational check list was used to assess the practice of staff nurses. The checklist consisted of 36 items under seven aspects like hand hygienic practices, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, surgical site infection, catheter associated urinary tract infection and biomedical waste management.

3.10b: Scoring and interpretation

Part II: Self-Administered Questionnaire

It consisted of 30 questions and had only one correct answer. Each correct answer was given with a score of 1 and wrong answer with a score of 0. The total score of the tool was 30.

The total score was converted into percentage and interpreted as follows.

- Inadequate knowledge - < 50%
- Moderately adequate knowledge – 51%-75%
- Adequate knowledge - >76%

Part III: Observational Check list

Checklist contained the list of activities to be carried out by the staff nurses while caring the patient. It consisted of 7 items with YES or NO options. The activities carried out by staff nurses were marked as YES options and weightage of 1 mark was given for each step and if the activities were not performed it was marked as NO option and weightage of 0 mark was given. The total score for practice was 36 and the same was converted into percentage and interpreted as follows.

- Inadequate practice - < 50%
- Moderately adequate practice – 51%-75%
- Adequate practice - >76%

3.10 c Intervention tool

The intervention was designed to enhance the knowledge and practice on infection control measures among the staff nurses.

The intervention included the following

X_1: Information transfer teaching

X_2: Demonstration on hand hygiene and personal protective equipments.

X_3: Exhibition on personal protective equipments and biomedical waste management.

X_1: Information transfer teaching

Information transfer teaching was administered to the staff nurses after completing the pre test. The investigator insisted on the general information of infection control measures, hand hygiene practice, personal protective equipments, prevention of ventilator associated pneumonia, prevention of catheter associated urinary tract infection, prevention of invasive line infection, prevention of surgical site infection, biomedical waste management by lecture and discussion with the help of power point presentation. It took nearly 30 minutes.

X_2: Demonstration on hand hygiene and personal protective equipments.

The demonstration of hand hygiene and use of personal protective equipment for the staff nurses was done within one day of information transfer teaching. It also took nearly 30 minutes.

X_3: Exhibition on personal protective equipments and biomedical waste management.

Exhibition on biomedical waste management and personal protective equipments was organized for the staff nurses.

Personal protective equipments-exhibits were

1. Shoe cover
2. Cap
3. Mask
4. Gown
5. Gloves

Exhibits for biomedical waste management were waste segregation based on the following colour coding.

1. Green
2. Yellow
3. Blue
4. Red
5. White

3.11 CONTENT VALIDATION OF TOOL

The content validity of the tool was established in consultation with 2 experts in the field of medicine and 4 experts in the field of nursing. Experts were requested to give their opinion and suggestions regarding relevance, appropriateness, accuracy, and degree of agreement in each item of the tool. The first draft of the knowledge questionnaire consisted of 25 questions and nurses performance observational check list consisted of 36 items, based on the suggestions and recommendations. 5 more items were added and two questions were modified in the knowledge tool. In the final draft, 30 questions in the knowledge questionnaire and 36 items in nurses performance observational check list was present.

3.12 ETHICAL CONSIDERATION

The study data collection process started after obtaining permission from the Institution Review Board of MMM College of Nursing and Ethical Committee of Madras Medical Mission hospital. Researcher also obtained permission from Head of

Infection Control Department. The following ethical principles were followed in the course of the study.

Ethical Principle	Action Carried out
Principle of beneficence	The study was beneficial for the participants as it enhanced the knowledge and infection control skill among staff nurses.
Principle of respect for human dignity	Those who were willing to participate were selected as samples for the study and right to withdrawn was ensured before data collection.
Principle of confidentiality	The information regarding the samples and their performance were kept confidential.
Principle of informed consent	Informed consent was obtained from all the samples selected for the study.

3.13 PILOT STUDY

Data collection process for pilot study started after obtaining permission from the Institution Review Board of MMM College of Nursing and Ethical Committee of Madras Medical Mission hospital. The sample was selected by non probability convenience sampling methods based on the inclusion criteria and purpose of study was explained to the participants. Informed consent was obtained. Data collection was done from the staff nurses of post operative intensive Care Unit of the Madras Medical Mission Hospital, who were not included in the main study. Data collection was done in three phases. During Phase I, pretest assessment of knowledge on infection control and practice was assessed using the structured self-administered questionnaire and nurse's performance observational check list. During the Phase II, infection control training programme was given to the staff nurses starting from the same day of the pre-test and continued for 2 more consecutive days. During the Phase III, post test was conducted after 1 week of the training programme. Collected data was coded, tabulated and analyzed using both descriptive and inferential statistics. The data were amenable to statistical analysis and feasible and tools were given in English language. The language

used in the tool was clear, simple, and unambiguous. Respondents were able to understand and respond to the items in the tool. The pilot study findings revealed that the tool is reliable and it is feasible to conduct the study.

3.14 RELIABILITY

The reliability of the knowledge tool was assessed using split – half method. Correlation coefficient was computed using Karl Pearson's Correlation.

$$r = \frac{N(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

The reliability value of r^1 was estimated by using the formula $r^1 = 2r/1+r$ and the estimated reliability value of knowledge was r =0.79

The reliability of practice tool was assessed by using inter-rater method. The estimated reliability r^1 value for the practice tool was r^1 =0.86

3.15 DATA COLLECTION PROCEDURE

The main study data collection process started after obtaining permission from the Institution Review Board of MMM College of Nursing and Ethical Committee of Madras Medical Mission hospital. Researcher also obtained permission from Head of infection control Department. Study was conducted among staff nurses working in post operative cardiac intensive care units of Madras Medical Mission hospital. A total of 40 sample were selected by non probability convenient sampling method as per the sample selection criteria in coordination with the nursing supervisors of cardiac unit. Staff nurses were divided into three batches. Their duty schedules were arranged accordingly to participate in the training programme with the help of incharge nurses. The data collection procedure was carried out in three phases.

Phase I: pre-test assessment: Pre-test knowledge of staff nurses was assessing by self administered questionnaire, (which took nearly 30 min) followed by pre-test practice of staff nurses were assessed on the same day for one full day.

Phase II: Within a day of pre-test completion, the staff nurses were given planned teaching programme on infection control measures which was developed by the investigator. It comprised of

1. **Information transfer**

   Information transfer includes general information on infection, hand washing, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, prevention of surgical site infection, prevention of urinary catheter infection, disinfection and sterilization, biomedical waste management which took nearly 30 minutes

2. **Demonstration**

   Demonstration on use of personal protective equipments and hand washing techniques

3. **Exhibition**

   Exhibition includes personal protective equipments and biomedical waste management.

Phase III: Post test was conducted after 1 week of planned teaching programme on infection control measures

After 1 week of the intervention post test assessment of knowledge and practice were done.

SCHEMATIC REPRESENTATION OF DATA COLLECTION PROCEDURE

Phases of Data Collection	Activity Done	Time and Duration
Phase I Pre- test assessment	Pre-test knowledge of staff nurses was assessing by self administered questionnaire includes general information on infection, hand washing, personal protective equipments, care of invasive lines, prevention of ventilator associated pneumonia, prevention of surgical site infection, prevention of urinary catheter infection, disinfection and sterilization, biomedical waste management	It took 30 minutes to complete prêtest assessment of knowledge One full day observation was done for pre-test assessment of practices.
Phase II Intervention phase	Infection control training programme was administered through Information Transfer, demonstration and exhibition.	Each group took 1 hours and 15 minutes to complete 3 sessions 1st Session-Information transfer which lasted for 30 minutes. 2nd Session–demonstration on hand washing techniques and use of personal protective equipments for 30 minutes 3rd Session – exhibition on personal protective equipments and biomedical waste management.
Phase III Post Assessment phase	Post test was conducted after 1 week of planned teaching programme on infection control measures After 1 week of the intervention post test assessment of knowledge and practice were done.	It took 30 minutes to complete post-test assessment of knowledge and One full day observation was done for post-test assessment of Practice.

Fig: 3.1: Schematic representation of data collection procedure.

3.16 DATA ANALYSIS PROCEDURES

Descriptive Statistics

1. Frequency and percentage distribution were used to analyse the demographic variables.
2. Frequency, percentage, Mean and standard deviation were used to assess the pre and post test level of knowledge and practices on infection control measures.

Inferential Statistics

1. Correlation and coefficient were used to find out the relationship between knowledge and practice among staff nurses.
2. Paired t-test was used to compare the pre and post-test level of knowledge and practice among staff nurses.
3. Chi-square was used to associate the mean differed knowledge and practice score with selected demographic variables of staff nurses.

DATA ANALYSIS AND INTERPRETATION

CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION

This chapter deals with analysis and interpretation of the data collected from 40 staff nurses to assess the effectiveness of planned teaching programme on knowledge and practices regarding infection control measures for post operative cardiac patients among staff nurses in selected hospital in Chennai. The data collected was organized, tabulated and analyzed according to the objectives. The findings based on the descriptive and inferential statistical analysis are presented under the following sections.

4.1 ORGANIZATION OF THE DATA

Section A: Description of demographic variables of staff nurses

Section B: Assessment of pre-test and post-test level of knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses.

Section C: Assessment of effectiveness of planned teaching programme on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses.

Section D: Assessment of relationship between the pos- test knowledge and practice scores regarding infection control measures for post operative cardiac patients among staff nurses.

Section E: Association of mean differed level of knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses with their selected demographic variables.

SECTION A: DESCRIPTION OF DEMOGRAPHIC VARIABLES OF STAFF NURSES

Table 4.1: Frequency and percentage distribution of demographic variables of staff nurses

N = 40

SL.NO	Demographic Variables	No.	%
1	**Age in years**		
	20 – 21	4	10
	22 – 23	23	57.5
	24 – 25	10	25
	More than 25	3	7.5
2	**Gender**		
	Male	0	0
	Female	40	100
3	**Educational Qualification**		
	Diploma Nursing	1	2.5
	B.Sc. Nursing	39	97.5
	M.Sc. Nursing	0	0
	Post Basic B.Sc. Nursing	0	0
4	**Duration of work experience**		
	<6 months	10	25
	6 months - 1 year	30	75
5	**Have you undergone any infection control training programme**		
	Yes	0	0
	No	40	100

The above table 4.1 shows frequency and percentage distribution of demographic variables of staff nurses.

With regard to age in years, 23(57.5%) of the sample were in the age group of 22 – 23 years, and 10 (25%) of them were in the age group of 24 – 25 years. 4(10%)

were in the age group of 20-21 and 3(7.5%) were in the age group of more than 25 years. With respect to gender all 40(100%) of the sample were females.

Regarding the educational level, majority 39(97.50%) of the samples were - educated up to B.Sc. Nursing, and only 1(2.5%) was general nursing and none of the sample fall under post basic nursing and Msc nursing category.

Considering the total years of the experience 30(75%) of the sample had 6months to 1 year of experience as staff nurse and 10(25%) of the sample had less than 6months of experience.

Regarding the attendance at the infection control programme, most of the 40(100%) of the sample had not attended any class on infection control training programme.

The study findings revealed that majority of the sample were young female nurses with B.Sc. nursing qualification. And they had nearly 6 months to 1 year of experience and all of them had not attended any classes on infection control previously.

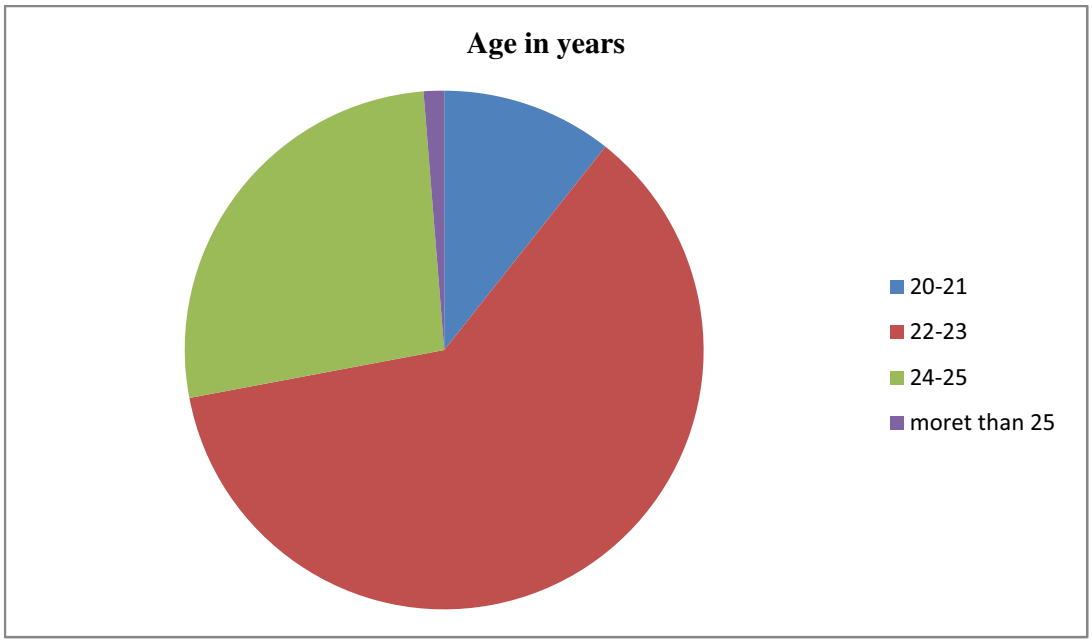

Fig.4.1: Percentage distribution of age of the staff nurses

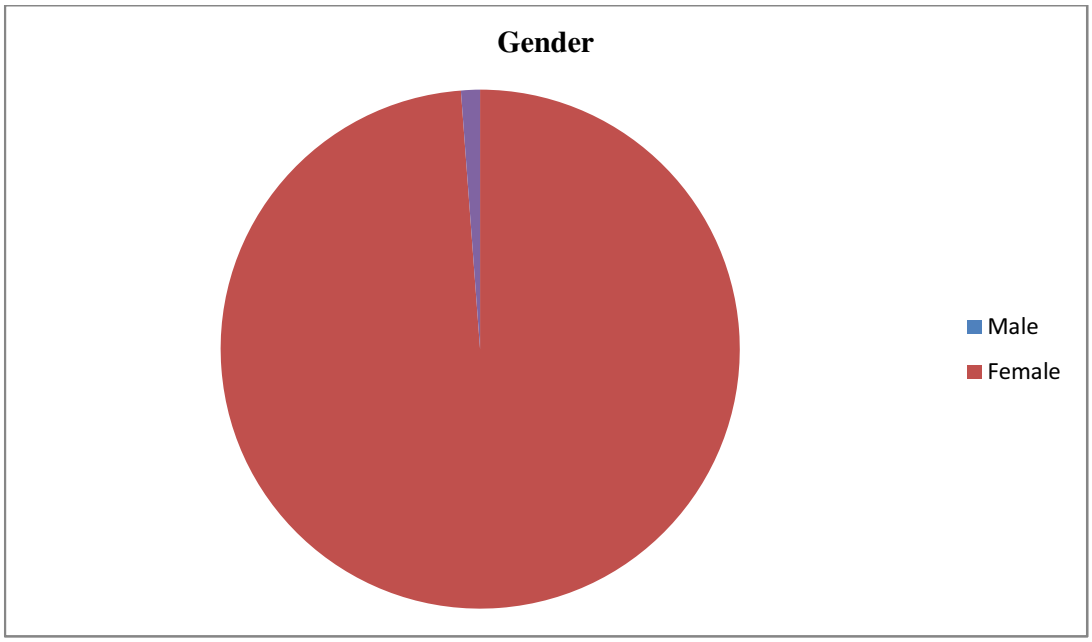

Fig.4.2: Percentage distribution of gender of the staff nurses.

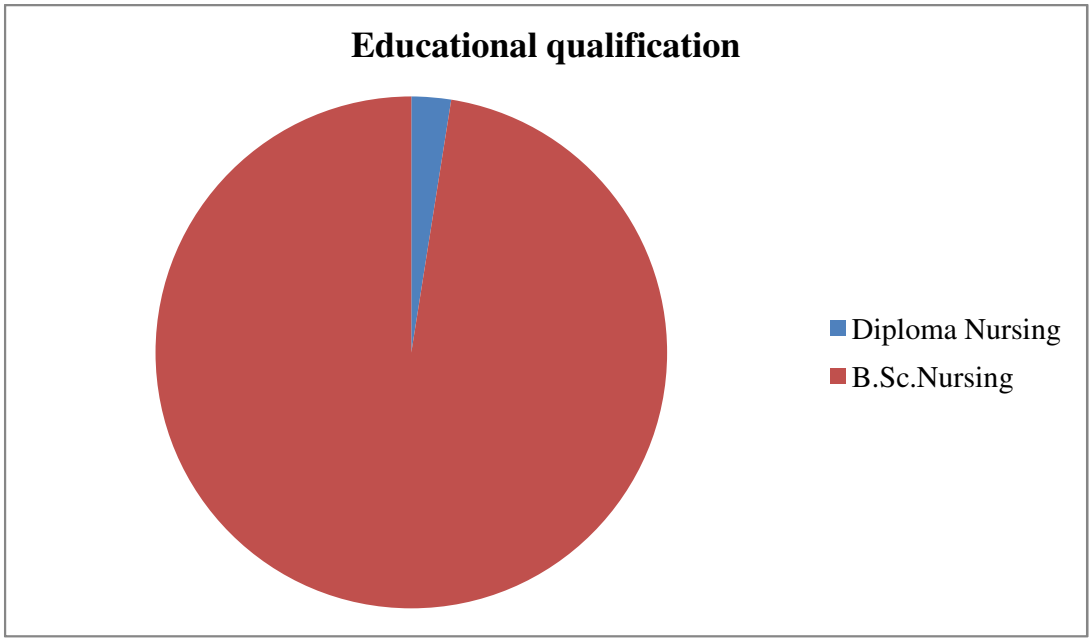

Fig.4.3: Percentage distribution of Educational qualification of staff nurses.

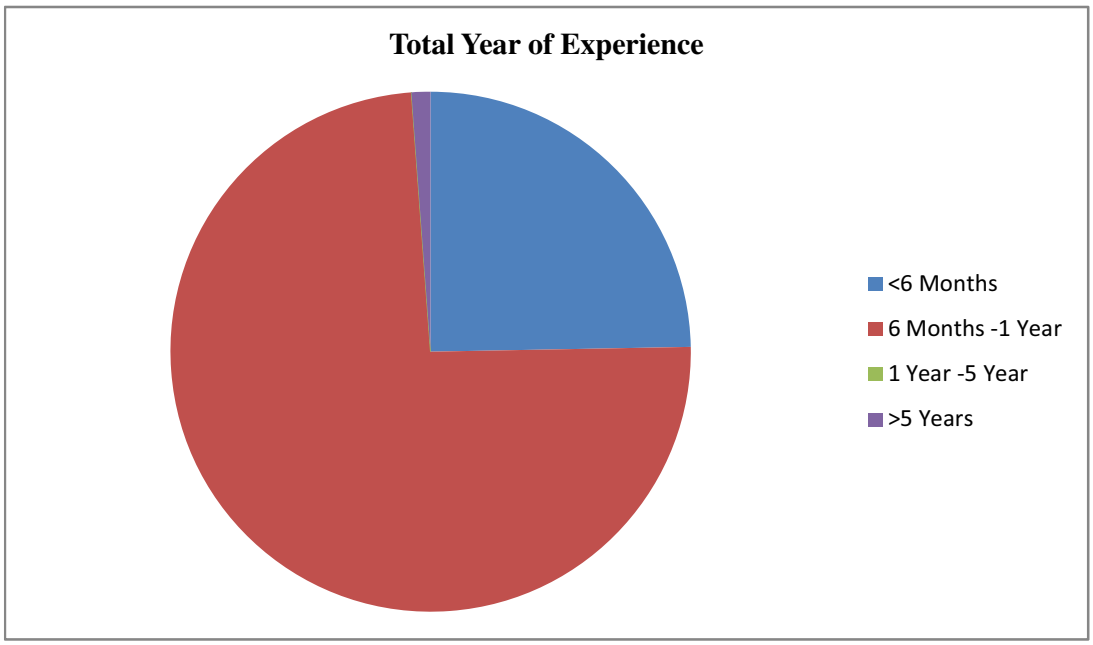

Fig.4.4: Percentage distribution of duration of work experience of the staff nurses

SECTION B: ASSESSMENT OF PRE-TEST AND POST-TEST LEVEL OF KNOWLEDGE AND PRACTICE REGARDING INFECTION CONTROL MEASURES FOR POST OPERATIVE CARDIAC PATIENTS AMONG STAFF NURSES.

Table 4.2: Frequency and percentage distribution of pre-test level of knowledge regarding infection control measures for post operative cardiac patients among staff nurses.

N = 40

Knowledge Aspects	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
General Information	4	10	19	47.5	17	42.5
Hand washing	27	67.5	13	32.5	0	0
Personal Protective Equipment	3	7.5	16	40	21	52.5
Care of Invasive Lines	11	27.5	22	55	7	17.5
Ventilator Associated Pneumonia	9	22.5	18	45	13	32.5
Prevention of surgical site infection	15	37.5	0	0	25	62.5
Prevention of urinary catheter infection	15	37.5	22	55	3	7.5
Disinfection and sterilization	14	35	16	40	10	25
Biomedical waste Management	7	17.5	32	80	1	2.5
Needle Stick Injury	16	40	14	35	10	25
Blood Spillage	15	37.5	20	50	5	12.5
Overall	**12**	**30.0**	**23**	**57.5**	**5**	**12.5**

The table 4.2 shows frequency and percentage distribution of pretest level of knowledge regarding infection control measures for post operative cardiac patients among staff nurses that in the pretest, with respect to knowledge majority of the sample 19(47.5%) had moderately adequate knowledge on general information, 27(67.5%) of the sample had inadequate knowledge on hand washing, 21(52.5%) of the sample had adequate knowledge on personal protective equipment, 22(55) of the sample had

moderately adequate knowledge on care of invasive lines, 18(45%) of the sample had moderately adequate knowledge on ventilator associated pneumonia, 25(62.5%) of the sample had adequate knowledge on prevention of surgical site infection, 22(55%) of the sample had moderately adequate knowledge on prevention of urinary catheter infection, 16(40%) of the sample had moderately adequate knowledge on disinfection and sterilization, 32(80%) of the sample had moderately adequate knowledge on biomedical waste management, 16(40%) of the sample had inadequate knowledge on needle stick injury, 20(50%) of the sample had moderately adequate knowledge on blood spillage.

The overall pretest level of knowledge revealed that, 23(57.5%) of the sample had moderately adequate knowledge, 12(30%) of them had inadequate knowledge and only 5(12%) of them had adequate knowledge regarding infection control measures for post operative cardiac patients among staff nurses.

Table 4.3: Frequency and percentage distribution of post-test level of knowledge regarding infection control measures for post operative cardiac patients among staff nurses.

N = 40

Knowledge Aspects	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
General Information	0	0	0	0	40	100.0
Hand washing	0	0	1	2.5	39	97.5
Personal Protective Equipment	0	0	1	2.5	39	97.5
Care of Invasive Lines	0	0	0	0	40	100.0
Ventilator Associated Pneumonia	0	0	0	0	40	100.0
Prevention of surgical site infection	0	0	0	0	40	100.0
Prevention of urinary catheter infection	0	0	0	0	40	100.0
Disinfection and sterilization	0	0	0	0	40	100.0
Biomedical waste Management	0	0	1	2.5	39	97.5
Needle Stick Injury	0	0	0	0	40	100.0
Blood Spillage	0	0	0	0	40	100.0
Overall	**0**	**0**	**0**	**0**	**40**	**100.0**

The table 4.3 shows Frequency and percentage distribution of post test level of knowledge regarding infection control measures for post operative cardiac patients among staff nurses in the post test, resulting the knowledge with respect to general information, care of invasive lines, ventilator associated pneumonia, prevention of surgical site infection, prevention of urinary catheter infection, disinfection and sterilization, needle stick injury, blood spillage all 40(100%) staff nurses had adequate knowledge regarding infection control measures for post operative cardiac patients among staff nurses.

With regards to hand washing, personal protective equipments, biomedical waste management 39(97.5%) had adequate knowledge and only 1(2.5%) had moderately adequate knowledge.

The overall post test level of knowledge revealed that all 40(100%) had adequate knowledge regarding infection control measures for post operative cardiac patients.

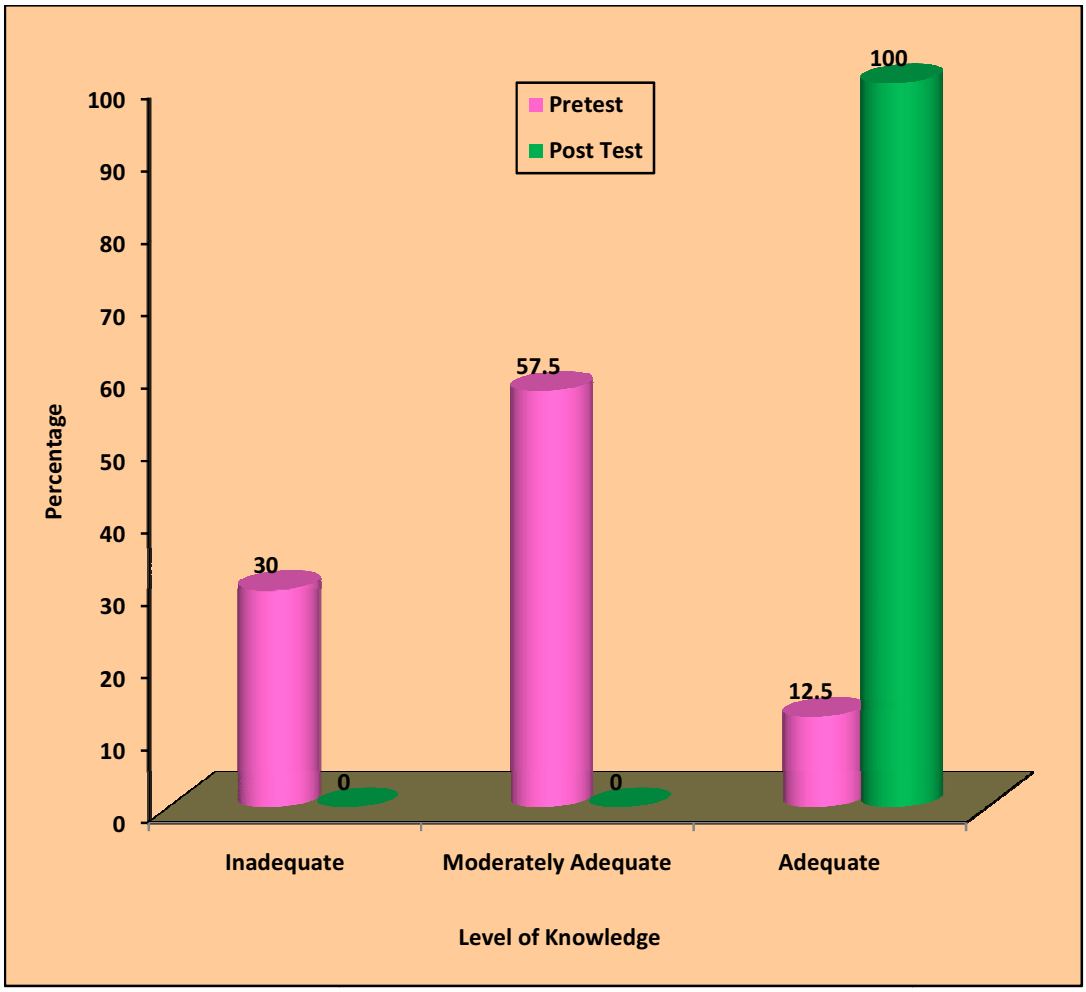

Fig.4.5: Percentage distribution of overall pre-test and post-test level of knowledge regarding infection control measures for post operative cardiac patients among staff nurses

Table 4.4: Frequency and percentage distribution of pre-test level of practice regarding infection control measures for post operative cardiac patients among staff nurses.

N = 40

Practice Aspects	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
Hand hygiene	36	90.0	4	10.0	0	0
Personal protective equipment	38	95.0	1	2.5	1	2.5
Care of invasive lines	37	92.5	3	7.5	0	0
Prevention of ventilator associated pneumonia	21	52.5	18	45.0	1	2.5
Prevention of surgical infection	29	72.5	11	27.5	0	0
Prevention of catheter associated urinary tract infection	20	50.0	20	50.0	0	0
Biomedical waste management	21	52.5	15	37.5	4	10.0
Overall	**36**	**90.0**	**4**	**10.0**	**0**	**0**

The table 4.4 shows the Frequency and percentage distribution of pretest level of practice regarding infection control measures for post operative cardiac patients among staff nurse with respect to pretest level of practice on hand hygiene, 36(90%) had inadequate practice. With regard to personal protective equipment, majority 38(95%) of the sample had inadequate practice. Considering the pretest level of practice on care of invasive lines majority 37(92.5%) of the sample had inadequate practice.

Regarding the prevention of ventilator associated pneumonia, 21(52.5%) of the sample had inadequate practice. Considering the prevention of surgical infection, 29(72.5%) of the sample had inadequate practice.

Regarding prevention of catheter associated urinary tract infection, 20(50%) of the sample had inadequate and moderately adequate practice and with respect to biomedical waste management, 21(52.5%) of the sample had inadequate practice.

The overall pre-test level of practice showed that 36(90%) had inadequate level of practice and 4(10%) had moderately adequate level of practice and none of them had adequate level of practice regarding infection control measures for post operative cardiac patients.

Table 4.5: Frequency and percentage distribution of post-test level of practice regarding infection control measures for post operative cardiac patients among staff nurses.

N = 40

Practice Aspects	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
Hand hygiene	1	2.5	6	15.0	33	82.5
Personal protective equipment	0	0	9	22.5	31	77.5
Care of invasive lines	0	0	10	25.0	30	75.0
Prevention of ventilator associated pneumonia	0	0	9	22.5	31	77.5
Prevention of surgical infection	3	7.5	20	50.0	17	42.5
Prevention of catheter associated urinary tract infection	0	0	21	52.5	19	47.5
Biomedical waste management	0	0	17	42.5	23	57.5
Overall	**0**	**0**	**11**	**27.5**	**29**	**72.5**

The table 4.5 shows Frequency and percentage distribution of post test level of practice regarding infection control measures for post operative cardiac patients among staff nurses. With respect to post test level of practice on hand hygiene 33(82.5%) had adequate practice ,6(15%) of the sample had moderately adequate practice and 1(2.5%) of the sample had inadequate practice.

With regard to personal protective equipment, majority 31(77.5%) of the sample had adequate practice, 9(22.5%) of the sample had moderately adequate practice.

Considering the pretest level of practice on care of invasive lines 30(75%) of the sample had adequate practice and 10(25%) of the sample had moderately adequate practice.

Regarding the prevention of ventilator associated pneumonia, majority 31(77.5%) of the sample had adequate practice and 9(22.5%) of the sample had moderately adequate practice.

Considering the prevention of surgical infection, majority 17(42.5%) of the sample had adequate practice, 20(50%) of the sample had moderately adequate practice and 3(7.5%) of the sample had inadequate practice.

Regarding prevention of catheter associated urinary tract infection, majority 21(52.5%) of the sample had moderately adequate practice and 19(47.5%) of the sample had adequate practice.

With respect to biomedical waste management, majority 23(57.5%) of the sample had adequate practice, 17(42.5%) of the sample had moderately adequate practice.

The overall post test level of practice showed that 29(72.5%) of the sample had adequate level of practice and 11(27.5%) had moderately adequate level of practice regarding infection control measures for post operative cardiac patients among staff nurses.

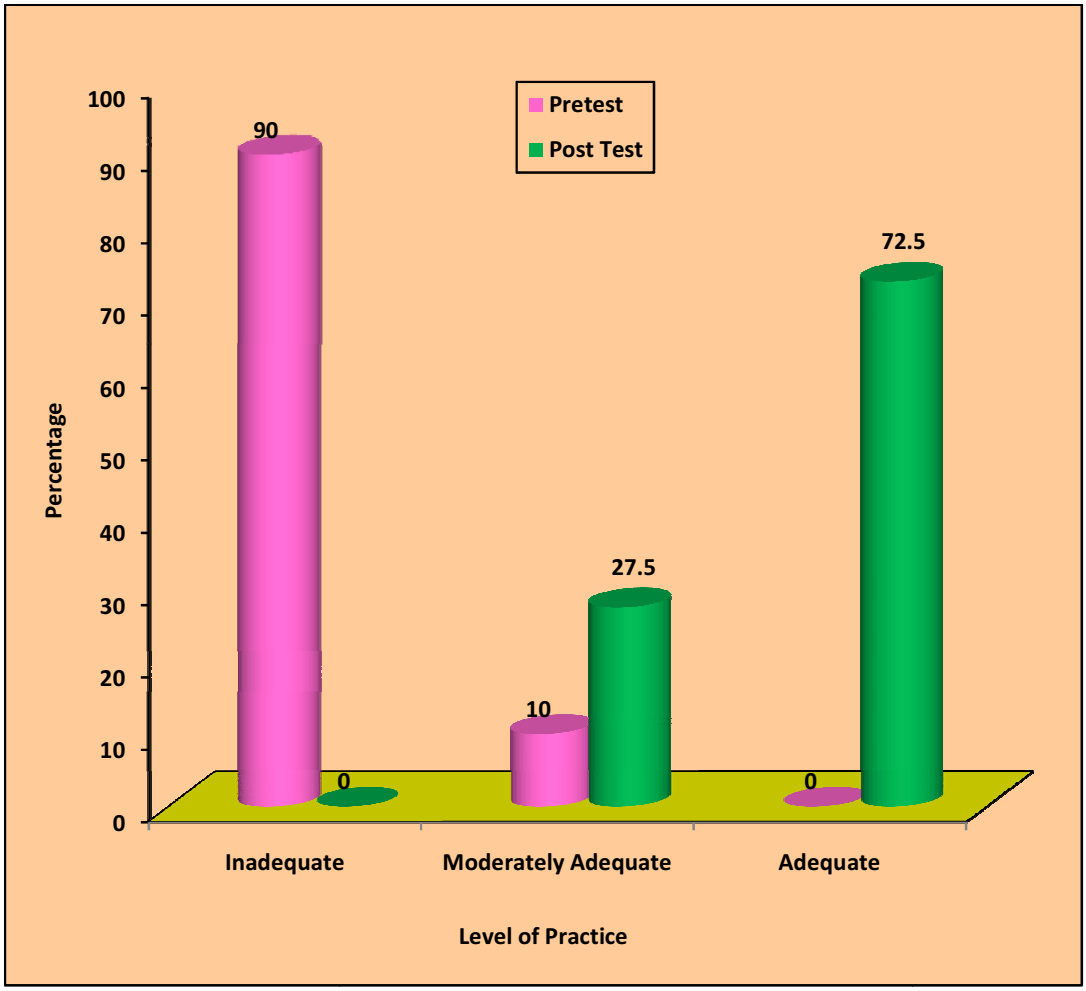

Fig.4.2: Percentage distribution of overall pre-test and post-test level of practice regarding infection control measures for post operative cardiac patients among staff nurses

SECTION C: ASSESSMENT OF EFFECTIVENESS OF PLANNED TEACHING PROGRAMME ON KNOWLEDGE AND PRACTICE REGARDING INFECTION CONTROL MEASURES FOR POST OPERATIVE CARDIAC PATIENTS AMONG STAFF NURSES.

Table 4.6: Comparison of pre-test and post-test knowledge scores regarding infection control measures for post operative cardiac patient among staff nurses.

N = 40

Knowledge	Mean	S.D	Paired 't' Value
Pretest	16.47	4.57	t = 18.463
Post Test	29.92	0.26	

***p<0.001, S – Significant

The table 4.6 shows comparison of pre-test and post-test knowledge scores regarding infection control measures for post operative cardiac patient among staff nurse. The findings revealed the mean score of pre test knowledge was 16.47 with the S.D of 4.57 and the mean score of post test knowledge was 29.92 with the S.D of 0.26. The calculated paired 't' value was t = 18.463 which was found to be statistically significant at p<0.001 level. This clearly indicate that the planned teaching programme on knowledge regarding infection control measures for post operative cardiac patients to staff nurses had significant impact in improving the level of knowledge of staff nurses in the post test.

Table 4.7: Comparison of pre-test and post-test practice scores regarding infection control measures for post operative cardiac patient among staff nurses.

N = 40

Practice	Mean	S.D	Paired 't' Value
Pre-test	12.75	2.59	t = 23.76
Post-test	30.70	4.13	p = 0.000, S***

***p<0.001, S – Significant

The table 4.7 shows comparison of pre-test and post test practice scores regarding infection control measures for post operative cardiac patient among staff nurses. The findings revealed that the mean score of practice in pre-test was 12.75 with S.D 2.59 and the mean score of practice in the post test was 30.70 with S.D 4.13. The calculated paired 't' value of t = 23.76 was found to be statistically significant at p<0.001 level. This clearly indicates that the planned teaching programme on practice regarding infection control measures for post operative cardiac patients to staff nurses had significant impact in improving the practice of staff nurses in the post test.

SECTION D: ASSESSMENT OF RELATIONSHIP BETWEEN THE POST-TEST KNOWLEDGE AND PRACTICE SCORE REGARDING INFECTION CONTROL MEASURES FOR POST OPERATIVE PATIENTS AMONG STAFF NURSES.

Table 4.8: Correlation between post-test knowledge and practice scores regarding infection control measures for post operative cardiac patients among staff nurses.

N = 40

Variables	Mean	S.D	'r' Value
Knowledge	29.92	0.26	r = 0.351
Practice	30.70	4.13	p = 0.027, S*

*p<0.05, S – Significant

The table 4.8 shows Correlation between post test knowledge and practice scores regarding infection control measures for post operative patients among staff nurses. The findings revealed that the post test mean knowledge score was 29.92 with S.D 0.26 and the post test mean score of practice was 30.70 with S.D 4.13. The calculated Karl Pearson's Correlation value **r = 0.351** which show a moderately positive correlation and was found to be statistically significant at p<0.05 level. This clearly indicated that when the knowledge of staff nurses, increases their practice level also increased.

SECTION E: ASSOCIATION OF MEAN DIFFERED LEVEL OF KNOWLEDGE AND PRACTICE REGARDING INFECTION CONTROL MEASURES FOR POST OPERATIVE PATIENTS AMONG STAFF NURSES WITH THEIR SELECTED DEMOGRAPHIC VARIABLES

Table 4.9: Association of mean differed level of knowledge regarding infection control measures for post operative patients among staff nurses with their selected demographic variables.

N = 40

SL.NO	Demographic Variables	Below average		Above average		Chi-Square Value
		No.	%	No.	%	
1	**Age in years**					$\chi^2 = 2.358$ d.f = 3 p = 7.82 N.S
	20 – 21	3	7.5	1	2.5	
	22 – 23	15	37.5	8	20	
	24 – 25	4	10	6	15	
	More than 25	2	5	1	2.5	
2	**Gender**					-
	Female	24	60	16	40	
3	**Educational Qualification**					$\chi^2 = 1.538$ d.f = 1 p = 3.84 N.S
	Diploma Nursing	0	0	1	2.5	
	B.Sc. Nursing	24	60	15	37.5	
4	**Duration of work experience**					$\chi^2 = 0.556$ d.f = 1 p = 3.84 N.S
	<6 months	7	17.5	3	7.5	
	6 months - 1 year	17	42.5	13	32.5	
5	**Have you undergone infection control programme**					-
	No	24	60	16	40	

N.S – Not Significant

The table 4.9 shows Association of mean differed level of knowledge regarding infection control measures for post operative patients among staff nurses with their selected demographic variables. The findings revealed that none of the demographic variables had shown statistically significant association with the mean differed level of knowledge regarding infection control measures for post operative patients among staff nurses.

Table 4.10: Association of mean differed level of practice regarding infection control measures for post operative patients among staff nurses with their selected demographic variables.

N = 40

Demographic Variables	Below average		Above average		Chi-Square Value
	No.	%	No.	%	
Age in years					$\chi^2 = 1.964$ d.f = 3 p = 7.82 N.S
20 – 21	3	7.5	1	2.5	
22 – 23	14	35	9	22.5	
24 – 25	4	10	6	15	
More than 25	2	5	1	2.5	
Gender					-
Female	23	57.5	17	42.5	
Educational Qualification					$\chi^2 = 1.388$ d.f = 1 p = 3.84 N.S
Diploma Nursing	0	0	1	2.5	
B.Sc. Nursing	23	57.5	16	40	
Duration of work experience					$\chi^2 = 0.034$ d.f = 1 p = 3.84 N.S
<6 months	6	15	4	10	
6 months - 1 year	17	42.5	13	32.5	
Have you undergone infection control programme					-
No	23	57.5	17	42.5	

N.S – Not Significant

The table 4.10 shows Association of mean differed level of practice regarding infection control measures for post operative patients among staff nurses with their selected demographic variables. The findings revealed that none of the demographic variables had shown statistically significant association with the mean differed level of practice regarding infection control measures for post operative patients.

DISCUSSION

CHAPTER – 5

DISCUSSION

The aim of the study was to assess the effectiveness of planned teaching program on infection control among the staff nurses working in post operative Intensive cardiac unit. The findings of the study were discussed based on the objectives.

Distribution of demographic variable

The selected demographic variables of the study were age, gender, educational level, duration of work experience and attendance at any class on infection control measures. With regard to age in years, majority 23(57.50%) of the sample were in age group of 22 – 23 years, 10(25%) of the sample were in the age group of 24-25, 4(10%) of the sample were in the age group of 20-21 and only 3(7.5%) of them were in the age group of more than 25 years. With respect to gender all 40(100%) of the sample were females. Regarding the educational level, majority 39(97.5%) of the sample were educated up to B.Sc. Nursing, and a few 1(2.5%) were general nursing and none of the sample fall under post basic nursing and M.Sc. nursing category.

Considering the total years of the experience 30(75%) of the sample had 6 months- 1 year of experience as staff nurse and 10(25%) of the sample had less than 6 months to 1 year of experience. Considering the attendance at any class on infection control programme 40(100%) of the sample had not attended any class on infection control measures.

The study findings revealed that majority of the sample were young female nurses with B.Sc. nursing qualification. And they had nearly 6 months - 1 year of experience and many of them had not attended any classes on infection control measures previously.

The first objective was to assess and the pre and post-test level of knowledge and practices of infection control measures among staff nurses.

The overall pre-test level of knowledge revealed that 12(30%) had inadequate knowledge and 23(57.5%) had moderately adequate knowledge regarding infection control measures, and only 5(12.5%) of the samples falls under the category of adequate

knowledge. The mean score of pre-test knowledge was found to be 16.47 with S.D of 4.57.

Considering the practice the overall pre-test level of practice revealed that 36(90%) had inadequate practice, 4(10%) of the samples had moderately adequate practice and none of them had adequate practice regarding infection control measures and the mean score of pre-test practice was found to be 12.75 with S.D of 2.59.

The overall post-test level of knowledge revealed that all 40(100%) had adequate knowledge and none of them had inadequate and moderately adequate knowledge regarding infection control measures. and the mean practice score in the post-test was found to be 29.92 with S.D of 0.26.

The overall post-test level of practice revealed that 11(27.5%) had moderately adequate practice and 29(72.5%) of the samples had adequate practice on infection control measures. The mean score of 30.70 with S.D of 4.13.

The findings of the study was supported by the following study,

Mody L (2010) conducted a self administered study to assess the knowledge of evidence based urinary catheter care practice recommendations among 440 health care workers in nursing homes by using questionnaire. The results revealed that 90% of health care workers knew the measures of cleaning around the catheter daily with the use of gloves and hand hygiene and 59% of nurses have less knowledge regarding disconnecting the catheter from bag. Around 48% of nurses were not doing routinely irrigating the catheters and 60% of nurses were not doing hand hygiene after casual contact and 27% of them were not aware about alcohol based hand rub. The study concluded that the nurses should improve the knowledge and practices regarding infection control.

Beghdadli B (2008) conducted a study to assess the standard precautions of practices among 450 nurses in a university hospital by using questionnaire. The findings revealed that 95% of the nurses reported, hand washing should be done after removing their gloves and 69% of them reported hand washing should be done after touching the patients. Recapping the needles were reported by two third of survey respondents. Lack

of hand washing techniques noted in many wards. The study concluded that lack of standard precautions is due to the less awareness of knowledge and practice on infection control among staff nurses.

The second objective was to correlate the level of knowledge and practice of staff nurses regarding infection control measures.

The findings revealed that the post-test mean knowledge score was 29.92with S.D of 0.26 and post-test mean practice score was 30.70 with S.D of 4.13.The calculated 'r' value was r = 0.351 which showed a moderately positive correlation between post-test knowledge and practice score which was found to be statistically significant at $p<0.001$.

The study findings showed that when the knowledge of staff nurses regarding infection control measures increases their practice level also increases.

Hence the null hypothesis stated that **"There is no significant relationship between the knowledge and practice on infection control measures among staff nurses."** was not accepted.

The third objective was to assess the effectiveness of planned teaching programme on knowledge and practice of staff nurses regarding infection control measures.

The findings revealed that the pre-test mean score of knowledge was 16.47 with S.D of 4.57 whereas in the post test the mean score of knowledge was 29.92 with S.D of 0.26. The calculated paired 't' test value of t = 18.463 was found to be statistically significant at $p<0.001$ which proved high level of statistical significance.

The findings revealed that the pre-test mean score of practice was 12.75 with S.D of 2.59 whereas in the post test the mean score of practice was 30.70 with S.D of 4.13. The calculated paired 't' test value of t = 23.76 was found to be statistically significant at $p<0.001$ which proved high level of statistical significance.

The study findings revealed that planned educational programme given to the staff nurses was effective and nurses had significant improvement in their level of knowledge and practice regarding infection control measures.

So the second null hypothesis stated that **"There is no significant difference between pre and post-test level of knowledge and practice regarding infection control measures for post operative cardiac patients"** was not accepted.

The findings of the study was supported by the following study,

Suchitra JB (2007) conducted a study to assess the impact of education on knowledge, attitudes and practices among 50 health care workers on nosocomial infections by using questionnaire. The results revealed that an increase in the number of subjects in each category scoring good and excellent in the post education questionnaire. The study concluded that the education programme has a positive impact on retention of knowledge, attitudes and practices in all the categories of staff nurses to reduce the infections.

Kapil R (2015) conducted a study to assess the hand hygiene in reducing transient flora on the hands of 60 health care workers by using questionnaire. The aim of the study to assess the effectiveness of education programme to prevent the infection. The results revealed that the bacterial count up to 100 colonies present 95 to 99 percentage of nurses and doctors before the application of hand rub while working in the hospital. Majority of the health care workers removed by proper hand washing after the educational programme. The study concluded that continuous educational programme improve the practice and knowledge of infection control.

The fourth objective was to associate the mean differed level of knowledge and practice regarding infection control measures with selected demographic variables of staff nurses.

The findings revealed that there was no statistically significant association was found with demographic variables such as age, gender, educational level, duration of work experience and attendance at any class on infection control measures.

The findings revealed that there was no statistically significant association found between the mean differed levels of practice and the demographic variables such as age, gender, educational level, duration of work experience and attendance at any class on infection control measures.

So the third null hypothesis stated that **"There is no significant association of mean differed level of knowledge and practice of the staff nurses with their selected demographic variables**" was accepted.

The findings of the study was supported by the following study,

Mathai AS (2011) conducted a prospective study to assess the efficacy of a multimodal intervention strategy in improving hand hygiene compliance in a tertiary level intensive care unit among the nurses by using self administered questionnaire. Results revealed that hand hygiene among nurses working in the intensive care unit was 26% and most of the nurses have the compliance of lack of time to do the hand washing(37%). There was found to be significant association between the years of experience of the staff nurses and there infection control practices and there was no significant association between age, gender and qualification with infection control practices.

SUMMARY,

CONCLUSION,

IMPLICATION,

RECOMMENDATION

AND LIMITATION

CHAPTER – 6

SUMMARY, CONCLUSION, IMPLICATION, RECOMMENDATION AND LIMITATION

This chapter deals with summary, conclusions, implications, recommendations and limitations.

6.1 SUMMARY

Identification and management of infection control measures is an important aspect of providing comprehensive medical care. The scientific study of hospital infections began during the first half of the 19th century. The nurses play a major role in providing care to the patients in all phases to control the infection. The infection control committee and infection control nurse to summarise the changes, problems, and advance in infection control up to the present time. It should be a regular practice in worldwide to employ the infection control nurses to establish the knowledge and practice of infection control. The enhancement of knowledge and practice regarding infection control is essential in preventing complications.

The planned educational programme focuses on enhancing the knowledge and practice of staff nurses regarding infection control during the pre and the post procedural period. The statement of the problem was "An experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses at selected hospital in Chennai."

OBJECTIVE OF THE STUDY

1. To assess the pre and post test level of knowledge and practices of infection control measures among staff nurses.
2. To correlate the post test level of knowledge and practice of staff nurses regarding infection control measures.
3. To assess the effectiveness of planned teaching programme on knowledge and practice of staff nurses regarding infection control measures.

4. To associate the mean differed level of knowledge and practice regarding infection control measures with selected demographic variables of staff nurses.

ASSUMPTION

1. Post operative cardiac patients are prone to get infection.
2. Staff nurses are with the patients round the clock and they need to be updated with continuing education and practical skills on infection control measures.

NULL HYPOTHESES OF THE STUDY

NH_1- There is no significant difference between pre and post level of knowledge and practice regarding infection control measures among staff nurses.

NH_2- There is no significant relationship between post-test knowledge and practice on infection control measures among staff nurses.

NH_3- There is no significant association of mean differed knowledge and practice with selected demographic variables of staff nurses.

The research methodology of the study was:

The approach used in the study was quantitative approach using pre-experimental one group pre-test and post-test research design. Forty samples were selected based on sample selection criteria using non probability purposive sampling technique. The study was conducted in MMM hospital, Chennai. The pilot study was conducted in MMM hospital after obtaining ethical clearance from the ethical committee of the institution with five staff nurses working in post operative intensive care unit which is located in the cardiac block to assess the feasibility and practicability of the study. The tools used for data collection was a self administered questionnaire to assess the knowledge level and nurses performance observational check list to assess the practice level of staff nurses on infection control. The data was collected in two phases.

In the initial or pre-assessment phase a good rapport was established with the staff nurses and the knowledge was assessed using a self-administered questionnaire consisting of 30 questions and each of them took 30 minutes to complete the questionnaire. In the phase II, the staff nurses who completed the pre-test were given a planned educational program in groups using power point presentation and each section

lasted for 30 minutes. The programme covered the general aspect of infection control, hand washing, personal protective equipment, care of invasive lines, prevention of ventilator associated pneumonia, prevention of surgical site infection, prevention of urinary catheter infections, disinfection and sterilization, biomedical waste management, needle stick injury, hospital spillage. In phase III, a post test was conducted after 7 days from the day of planned educational programme with the same self-administered questionnaire and nurses performance observational check list for the same group in same manner which was followed in pre-test. The data was analysed using descriptive and inferential statistics.

The major findings of the study were:

- The findings related to demographic variables revealed that majority of the samples were young female nurses with B.Sc. nursing qualification and they had nearly 6 months to 1 year of experience and many of them had not attended any class on infection control previously.
- The overall pre-test level of knowledge revealed that 12(30%) had inadequate knowledge and 23(57.5%) had moderately adequate knowledge regarding infection control, and none of the samples falls under the category of adequate knowledge.
- The overall post-test level of knowledge revealed that majority 40(100%) had adequate knowledge regarding infection control.
- The overall pre-test level of practice revealed that 36(90%) had inadequate practice and 4(10%) had moderately adequate practice and none of the samples had adequate practice regarding infection control.
- The overall post-test level of practice revealed that 11(27.5%) had moderately adequate practice regarding infection control and 29(72.5%) had adequate practice regarding infection control.
- The findings also revealed that the pre-test mean score of knowledge was 16.47 with S.D of 4.57 whereas in the post test the mean score of knowledge was 29.92 with S.D of 0.26. The calculated paired 't' test value $t = 18.463$ which was found to be statistically significant at $p<0.001$.

- The findings revealed that the pre-test mean score of practice was 12.75 with S.D of 2.59 whereas in the post test the mean score of practice was 30.70 with S.D 4.13. The calculated paired 't' test value t = 23.76 which was found to be statistically significant at $p<0.001$.
- The findings revealed that the post-test mean knowledge score was 29.92 with the S.D of 0.26 and post-test mean practice score was 30.70 with the S.D of 4.13. The calculated 'r' test value r = 0.351 showed a moderate positive correlation between post-test knowledge and practice score which was found to be statistically significant at $p<0.001$.
- The findings revealed that there was no statistically significant association was found with other demographic variables such as age, gender, educational level, duration of work experience and attendance at any class on infection control measures.
- The findings revealed that there was no statistically significant association found between the mean differed level of practice and demographic variables such as age, gender, educational level**,** duration of work experience and attendance at any class on infection control measures.

6.2 CONCLUSION

The study concluded that the planned educational programs was effective in improving the knowledge and practice of staff nurses. It helped them to be more confident in their duty and to omit errors. The unit-based collaborative learning activities and competency skills validation helped reinforce the content of the educational program. In order to improve patient outcomes, this type of program may be more effective if it were to involve all of the staff members on the unit who are responsible for patient care. More research is needed to establish to improve the effectiveness of the program in improving patient outcomes when all staff is included and if additional strategies are used, such as unit champions and group rewards.

6.3 NURSING IMPLICATION

The implications of the study can be seen in the area of nursing practice, nursing service and nursing research.

Nursing Practice

- Staff nurses must be competent and could earn points towards their Clinical Practice Developmental Program thereby professional development.
- The nursing manager or unit educator could be responsible for updating the policy.
- Expand the training on infection control practices at the appropriate level for all staff nurses.
- Units that should be included are telemetry units, intensive care units, progressive care units, emergency departments, and where ever infection control is performed.
- The practical skills of the nurses can be assessed using the nurses performance observational checklist on infection control.

Nursing Education

- Nurse educators should incorporate the importance of infection control in the curriculum from first year nursing program.
- Nurse educators should develop the skill among nursing students on preventing infection.
- Nurse educator should encourage the students to organize educational programs to emphasize the importance of infection control.
- In-service education, refresher course and training programs on infection control should be systematically planned and regularly conducted at various settings.
- All nurse educators for critical care areas could collaborate to develop and teach the courses about infection control.
- Continuing Nursing Education programme should be mandatory for all staff and enforced by nursing managers.
- For nurses, their infection control education should include the following component
  - General information on infection
  - Hand hygienic practice
  - Standard precautions
  - Personal protective equipments
  - Prevention of ventilator associated pneumonia

- Prevention of surgical site infection
- Prevention of urinary catheter infection
- Safe injection practice
- Biomedical waste management
- Prevention of needle stick injury

- Continuing education credit is an important incentive to some nurses, so it should continue to be offered.
- Another recommendation to improve participation of staff is to ask for volunteers from each job class and shift to be nurse leaders, who would motivate the staff and lead unit-based collaborative learning activities similar to ones that were done in this research project.
- The nurse educator or assistant nurse managers should validate the unit champion‘s skill competency and then determine if the champion may document other staffs ‘competency with the skills.

Nursing Administration

- Nurse administrator should remain updated with knowledge on infection control
- The nurse administrator should encourage and facilitate the staff nurses to update their knowledge regarding infection control.
- Nurse Managers can strengthen interdisciplinary and multidisciplinary collaboration with researchers.
- The nurse administrator and infection control nurse can organize conferences, continuing education programs, in-service education programs to introduce the needed changes coming up through ongoing scientific research regarding infection control.
- If the unit shows an improvement towards meeting or exceeding the hospital average, incentives or rewards could be provided to the whole unit.
- If an employee is consistently not following the policy, the nursing manager should provide individual feedback and assist the nurse to develop an action plan for improvement.
- The graduate nurse as a novice to advanced beginner may need to be evaluated before enrolment of the infection control.

- For ongoing reinforcement, assistant nurse manager's educators and infection control nurse should conduct periodic patient audits.

Nursing Research

- The results of this research study should only begin to guide educators when selecting teaching strategies for classroom and clinical learning.
- The findings of the present study serve as basis for other health care professionals and to the nursing students to conduct further studies and to find out the effectiveness of infection control practices.
- The nurse scientist should communicate these findings to the public so as to enhance the infection control training programme for the staff nurses.
- The study implies that staff nurses education has a significant role in improving their knowledge regarding infection control in reducing the in-hospital co-morbidities.
- Research should be expanded in relation to preference of learning styles and teaching strategies for registered nurses on infection control practice .

RECOMMENDATION

Based on the study findings, the following recommendations were made

1. A similar study could be done with other teaching strategies to identify the differences in their knowledge and practice of infection control.
2. Compare classroom & online methods for teaching nurses and nursing students on basics of infection control measures.
3. The nurse researcher recommends the department of cardiology and nursing service of Madras Medical Mission hospital to utilize this study as a model and to conduct periodic in-service education programme on infection control.
4. The intervention tool can be utilized by the health care professionals, infection control nurse, nurse educators and clinical instructors in their future.
5. The effect of the educational programme on infection control can be evaluated on long term basis.

LIMITATION

There were several limitations to this study.

1. It was conducted with a very small sample size of nurses in post operative cardiac unit and results cannot be generalized to other groups.
2. Nurses were the only staff members who received the education and were included in the study of infection control.
3. Study only evaluated the knowledge and practices of infection control.

PLANS FOR RESEARCH DISSEMINATION

- The findings of the research will be disseminated through paper presentation either in conferences, workshops at the national and international level or will be published in specialty Journal or research journals and articles.

PLAN FOR RESEARCH UTILIZATION

- The findings of the research study on infection control will be utilized in both the nursing education and nursing service.
- The nurse researcher recommends the department of cardiology and nursing service of Madras Medical Mission hospital to utilize this study for infection control practice .

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APPENDICES

MMM COLLEGE
OF NURSING
Learn to Serve
A Unit of
The Madars Medical Mission

MMMCON/RL/14/2015 **24th April 2015**

To
Dr. Jayaraju
Medical Superintendent
Madras Medical Mission
Chennai

Respected Sir,

This is to certify that **Ms. Stiji Samuel** is a bonafide student of MMM College of Nursing and currently undergoing MSc(N) in the branch of Medical Surgical Nursing (Cardio Thoracic Nursing). As part of her Curriculum, she needs to conduct a study in the department of Cardiology for her dissertation. Her problem statement is **"A pre experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses in selected Hospital at Chennai"**

The same was accepted by the ethical committee of the MMM Hospital. Kindly permit her to do the main study & pilot study.

Kindly do the needful

Thank You

24/4/15
DR. ROSALINE RACHEL, PH.D
PRINCIPAL
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Ms Stiji Samuel
24/4/15

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INSTITUTIONAL ETHICS COMMITTEE
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E-mail : icvddoctors@mmm.org.in Website : http://www.mmm.org.in

To

Date: 23 Feb 2015

Ms. Stiji
Madras Medical Mission,
Chennai 600037

EC Reg no: ECR/140/Inst/TN/2013

Ref: An experimental study to assess the effectiveness of planned teaching programme on knowledge and practices regarding infection control measures for post operative cardiac patients among staff nurses in selected hospital in Chennai

Sub: Ethics Committee approval of study document for the above mentioned study.

Dear Ms. Stiji,

We have received from you 06+1 copies of each of following study related document submitted vide letter dated: 10 Jan 2015.

1. Protocol

At the Ethics Committee meeting held on 14 Feb2015 your referenced letter and the above documents were examined and discussed. After due consideration, the committee has decided to approve the above-mentioned document.

The following members were present at the meeting held on 14 Feb 2015 at 9-30 AM at Mount Tabour Lounge, Madras Medical Mission.

Name & Qualification	Primary Scientific or Non scientific Specialty	Affiliation with the institution	Gender
Dr. M.S. Ramachandran, MBBS,MD,FRCP,FICP,DSC(HONS), Prof.Director medicine(Rtd)	Chairperson	No	M
Dr V M Kurian, MS, MCh, DPMR. Sr. Consultant cardiovascular Surgeon Madras Medical Mission	Member secretary	Yes	M

INSTITUTIONAL ETHICS COMMITTEE
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Dr Ajit Mullasari, MD DNB DM, Director of cardiology, Madras Medical Mission	Member Clinician	Yes	M
Dr J. Ezhilan MD, DM , DNB, FNB Sr. Consultant Cardiologist, Madras Medical Mission	Member Clinician	Yes	M
Dr. Suma Malini Victor, MBBS, DNB., Consultant Cardiologist, Madras Medical Mission	Member, Clinician	Yes	F
Dr. Chitrasree V, MBBS,DCP Coordinator, Consultant Lab services, Madras Medical Mission	Member, Basic Medical Scientist	Yes	F
Rev.Fr. Ninan Chacko, MA,DPS, Chaplain Theologist, ICVD, Madras Medical Mission	Non-Clinical Member Theologist/Layperson	Yes	M
Mr. Ravi Kumar Paul, LLB Paul & Paul B.A., B.L., Advocates Chennai.	Member Legal Expert	No	M
Dr. C.B Tharani, M.D. Pharmacology	Pharmacologist	No	F
Dr. Philomina Mariados, PhD(Sociology), Dean, College of Health Science, Madras Medical Mission	Member, Lay person	Yes	F

The Committee expects from the Principal Investigator to report the clinical study on annual basis.

It was to be noted that neither you nor any of your proposed study team members were present during the decision-making procedures of the Ethics Committee.

Yours truly,

Signature: _____ **Date:** 23/02/2015

Name: Dr V M Kurian
Title: Member secretary

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL MISSION
No. 4 - A, Dr. J.J. NAGAR,
MOGAPPAIR, CHENNAI - 600 037.

APPENDIX – C

INFORMED CONSENT FORM

Respected Sir/ Madam,

I am pursuing my M.sc in Nursing at MMM College of Nursing, Chennai for which I am doing research on **effectiveness of planned teaching program on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses**. I kindly request you to participate and provide the baseline information about you. I also request you to give answer on questions related to infection control perception. I expect your co-operation while assessing the knowledge and practice. I assure you that the details you provided will be used for my research only and will be kept confidential. The participation is not compulsory and you can withdraw from the study at any time. You can clarify any queries related to this. I also assure that the intervention provide will not harm you at any cost.

Stiji Samuel
M.Sc Nursing Student
MMM College of Nursing

I would like to participate in the study.

Signature of the Participant:

Date:

APPENDIX – D

TOOL FOR DATA COLLECTION

PART -I DEMOGRAPHIC DATA

1. Age in years
    a) 20-21
    b) 22-23
    c) 24-25
    d) More than 25

2. Gender
    a) Male
    b) Female

3. Educational qualification
    a) Diploma nursing
    b) B.Sc nursing
    c) M.Sc nursing
    d) Post basic B.Sc Nursing

4. Total years of experience
    a) < 6 months
    b) 6 months-1 year
    c) 1 year-5 years
    d) > 5 years.

5. Have you undergone any special infection control training programmes
    a) Yes
    b) b) No
    If yes specify ----------

PART-II: SELF ADMINISTERED QUESTIONNAIRE TO ASSESS THE KNOWLEDGE OF INFECTION CONTROL MEASURES AMONG STAFF NURSES

INSTRUCTIONS: Kindly go through all the questions carefully and choose the best answer by placing a tick mark against the right option

GENERAL INFORMATION ON INFECTION

1. The substance produced by human body to fight against micro organisms is
   a) Antibody
   b) b) antigen
   c) c) lymphocytes
   d) d) eosinophils

2. Common infection among the post operative cardiac patient is
   a) Gastro intestinal infection
   b) Respiratory tract infection
   c) Central Nervous System infections
   d) Musculo skeletal infections

3. Infections are transmitted by
   a) Inadequate hand hygiene
   b) wearing personal protective equipment
   c) clean environment
   d) following aseptic technique

4. A post operative cardiac patients can acquire infection from the health care workers when they
   a) Cough and sneeze
   b) Wear gloves
   c) dispose the needles properly
   d) Perform good hand hygiene.

5. The common infection associated with health care agency are
   a) UTI and blood stream infection
   b) Surgical site infection and Ventilatory associated pneumonia
   c) HIV and HbSAg
   d) a and b

6. Transmission of infection can be prevented by
   a) Isolation b) wearing personal protective equipment
   b) hand washing d) all of the above

7. Nosocomial infection are otherwise known as
   a) Hospital acquired infection
   b) Community acquired infection
   c) Water borne infection
   d) Viral infection

HAND WASHING

8. WHO guidelines for hand washing techniques consist of
   a) 6 steps
   b) 9 steps
   c) 7 steps
   d) 10 steps

9. The disinfectant used for hand rub consists of
   a) Ethyl alcohol and chlorhexidine
   b) Betadine and methyl alcohol
   c) Sterile water and hydrogen peroxide
   d) Chlorhexidine and betadine

10. Approximate time duration for performing a surgical scrub as per WHO guidelines is
    a) 40-60 seconds
    b) 10-20 seconds
    c) 20-25 seconds
    d) 15-20 seconds

11. Hand washing helps in the removal of
    a) transient flora
    b) residual flora
    c) pathogens
    d) all the above

PERSONAL PROTECTIVE EQUIPMENT

12. Use of gloves protects infections from
    a) blood and body fluids
    b) droplets
    c) secretions
    d) a and c

13.Order of wearing personal protective equipment is
    a) Glove, apron, mask, shoe cover, cap
    b) Mask, shoe cover apron gloves, cap
    c) Apron, mask, shoe cover, gloves, cap
    d) Shoe cover, cap, mask, apron , gloves

CATHETER ASSOCIATED INFECTIONS

14. Flushing of IV line is done
    a) before giving medications
    b) after giving medications
    c) before and after giving medications

15. Suction catheter should be used only for
    a) one time
    b) 2 times
    c) 3 times
    d) 4 times

VENTILATOR ASSOCIATED PNEUMONIA

16. Bacterial filter should be change every

a) 48hrs
b) 20 hrs
c) 24 hrs
d) 72 hrs

17.Oral care for ventilator patients should be given with

a) Chlorhexidine
b) Sterile water
c) Normal saline
d) betadine solution

18. The position recommended for patient on ventilator is

a) Head end elevated by 30-40 degree
b) Right lateral
c) High fowlers
d) Left lateral

SURGICAL SITE INFECTION

19. Skin preparation should be done

a) 24 hours prior to surgery
b) day of surgery
c) 48 hours prior to surgery
d) 72 hours prior to surgery

DISINFECTION AND STERILIZATION

20. After the fumigation the area should be sealed for

a) 24 hrs
b) 48 hrs
c) 72 hrs
d) 50 hrs

21. Solution used for fumigation is
    a) Formaldehyde
    b) Chlorhexidine
    c) Sodium hypochlorite
    d) Betadine

BIOMEDICAL WASTE MANAGEMENT

22. Used mask must be disposed in to which of the following bin.
    a) Yellow bin
    b) Red bin
    c) Blue bin
    d) Green bin

23. Infectious waste is discarded in
    a) Yellow bin
    b) Red bin
    c) Green bin
    d) Blue bin

24. Untreated biomedical waste can be stored for
    a) 24 hrs
    b) 48 hrs
    c) 72 hrs
    d) 15 hr

25. Disinfectant recommended for sharp container is
    a) 1% sodium hypochlorite
    b) 25% Lysol
    c) 2% chlorhexidine
    d) 4% dettol

NEEDLE STICK INJURY

26. Immediate first aid measure for needle stick injury is

    a) soak the area in antimicrobial solution

    b) wash under running water

    c) squeeze out the blood from the site of injury

    d) wash with soap solution

27. Used needle should

    a) be recapped with one hand

    b) not be recapped

    c) be recapped with assistant

    d) be recapped with two hands

28. Most common infection acquired from needle stick injury is

    a) Syphilis

    b) Hepatitis-B

    c) HIV

    d) HCV

BLOOD SPILLAGE

29. Blood spill must be covered and soaked with disinfectant for

    a) 10-15minutes

    b) 5minutes

    c) 10 minutes

    d) 20-30 minutes

30. Solution used as disinfectant for blood spillage is

    a) 10% sodium hypochlorite

    b) 5% hydrogen peroxide

    c) 10% sodium bicarbonate

    d) 10% Lysol

ANSWER KEY

1	A	16	a
2	B	17	a
3	A	18	a
4	A	19	a
5	D	20	b
6	D	21	a
7	A	22	a
8	A	23	b
9	A	24	a
10	A	25	a
11	A	26	b
12	D	27	b
13	D	28	b
14	C	29	d
15	A	30	a

PART–III: OBSERVATIONAL CHECKLIST TO ASSESS THE INFECTION CONTROL PRACTICES

SL.NO.	OBSERVATION	YES	NO
	HAND HYGIENE		
1	Hands are free of jewelers and other accessories		
2	Sleeves are above the elbows		
3	Nails are trimmed.		
4	Washes hands during moments of hand washing 1. Before touching a patient 2. Before a procedure 3. After a procedure 4. After touching a patient 5. After touching a patient surroundings		
5	Follows all the steps of hand washing		
6	Washes the hand minimum 40-60 seconds		
7	Hands are rinsed with sufficient running water		
8	Dries hand with paper towel or sterile clothes		
	PERSONAL PROTECTIVE EQUIPMENT		
9	Wears sterile gloves, in case of contact with non intact skin		
10	Wears gloves when handling blood, body fluids and secretions		
11	Washes hands or rub with alcohol while handling soiled linen		
12	Wears apron when there is a risk of contact with blood, body fluid and secretions		
13	Wears mask during suctioning and other cough inducing procedures.		

SL.NO.	OBSERVATION	YES	NO
	CARE OF INVASIVE LINES		
14	Assess the cannula site for patency and signs for inflammation before administration of medication and fluids		
15	Disinfects the external surfaces of the catheter hub and connection points before giving the medication.		
16	Replaces intravenous tubing's within 24 hours of initiating the infusion		
17	Flushes the CVP line before and after administering medications.		
18	Wears cap , mask ,glove ,aprone ,while handling CVP lines		
	PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA		
19	Uses sterile water while suctioning		
20	Elevates the head end of the bed to 30-40 degrees		
21	Drains and discards condensed fluid that is collected in ventilator tubings		
22	Performs oral care 4^{th} hourly		
23	Uses single use catheter for suctioning		
24	Encourages the patients to do spirometric exercises.		
	PREVENTION OF SURGICAL SITE INFECTION		
25	Washes hands before and after taking care of surgical wound		
26	Follows aseptic technique while changing the dressing		
27	Administers anti microbial agents as prescribed		
	PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTION		
28	Performs catheter care twice daily.		
29	Follows aseptic technique during catheter care.		

SL.NO.	OBSERVATION	YES	NO
30	Empties the uro bag when it fills 3/4th		
31	Encourages the patient to drink adequate water if not contraindicated.		
	BIO MEDICAL WASTE MANAGEMENT		
32	Sharp objects are disposed in a puncture resistant container		
33	Discard Infectious waste in yellow bin		
34	Discard General wastes green bin.		
35	Discard Ampoules in blue bin.		
36	Discards plastics in red bin		

If the nurse performs all the sub items a ✓ will be put in yes column and it carries 1 mark

PLANNED EDUCATIONAL PROGRAMME ON INFECTION CONTROL

Topic	**:**	Infection control measures
Group	**:**	Staff Nurses
Place	**:**	MMM Hospital
Date	**:**	15/5/15
Time	**:**	10.30 am
Teaching methods	**:**	Lecture
Name of student	**:**	Stiji Samuel

Central objectives

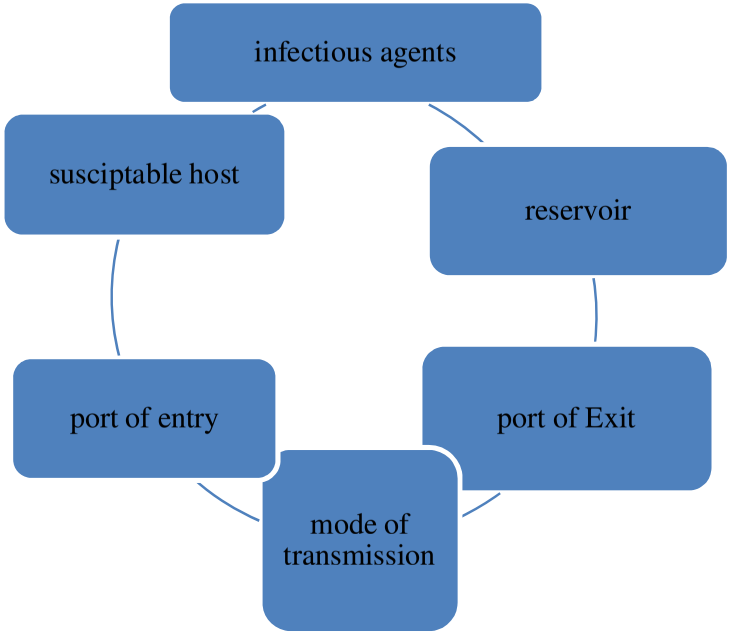
The demonstration will help the group to gain knowledge regarding hand washing and personal protective equipments develop positive attitude in practicing the same.

Specific objectives

1. Discuss the general information about infection
2. Explain about hand washing practices.
3. Discuss in detail about personal protective equipment
4. Describe the care of invasive lines
5. Explain the nursing care measures of ventilator associated pneumonia.
6. State the preventive measures of surgical site infection
7. Recognizing the preventive measures of urinary catheter infection.
8. Discuss about biomedical waste management

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
	2 min	Staff will be able to introduce the topic	**INTRODUCTION** The common complications in the health care settings are health care associated infections. The incident rate is increasing because of the duration of hospital stay and hospital procedures. Several states have passed legislation requiring hospital to report their infection and specific type of infection. Infection prevention and control in all health care environment for clients and staff. as a nurse we have a major role in the prevention of infection. The overall incidence of infections over the past 20 years is increased 36% and in the united states, the overall death was 99,000.	The teacher introduced the topic	Listening	
1.	5 min	Discuss the general information about infection	**INFECTION** Infection is the entry and multiplication of organisms in our body. If a pathogen is present in a host does not mean the infection will occur. The presence of microorganisms and multiplies but does not cause an infection, this is referred to as a colonization. The invasion of body tissue by microorganisms and growth which is resulting signs and symptoms called infection.	The teacher discussed the general information about infection	Listening and observing	What is infection

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			AGENTS OF INFECTION • Virus • Bacteria • Fungi **Virus** It is an infection which is caused by influenza virus. It can enter into the different parts of the body. Some of the virus will enter into the intestine, lungs and airways. **Bacteria** Bacteria are a single celled or rod shaped organisms which is lacking chlorophyll that reproduce by fission. **Fungi** Fungi is a single celled or muticellular organisms. It can cause an infections in healthy persons or immunocompromised persons. Fungi is also used for the development of antibiotics, antitoxins and other drugs used to control various human diseases.		‘	

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			CHAIN OF INFECTION The pathogen does not mean that an infection can occur. The infection is occurring in a cycle that depends on the presence of all of the following elements.  **Infectious agent** The micro organisms of infectious agents include bacteria, viruses, fungi and protozoa. Microorganisms on the skin are transient flora. This will			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			survive and multiply without causing illness. (CDC 2002, WHO 2009). It serves as a major part of the body's protection. Resident flora on the skin covers the entire body and also this protect against the pathogens. Human body fight against antibody. The transient organisms will attach to the skin when the patient has contact with another person or an object. **Reservoir** Reservoir means a place where multiply the microorganisms and to transfer to a susceptible host. The common infections among the post operative cardiac patients are respiratory tract infections. A variety of microorganisms lives in the skin and the body cavities, discharges and fluids. Carries will not show any signs and symptoms of disease but the pathogens in the body can transmit the infection from one to another. E.g: food, animal, sexual contacts, insects. **Port of exit** These microorganisms will find a place to multiply. This will cause another disease. Port of exit includes blood, skin, respiratory tract, mucous membranes.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Mode of transmission Hand washing will helps to remove the transient flora. The practice of hand hygiene will prevent the transmission of infection from one object to another. Unwashed hands in heath care settings are the major route of transmission of infection. (CDC 2002, WHO 2014, Cipran 2007) **Port of entry** The route of entry to the body or an object may use for existing the microorganisms. If there is an improper skin preparation, the infection can occur from any source. **E.g.:** Improper skin preparation before needle prick can enter the microorganisms. **Susceptible host** Susceptibility of an infectious agent is depending upon the individual's degree of resistance to pathogens. All are constantly contact with large number of microorganisms. The infection does not spread until the person become susceptible to the strength and numbers of micro organisms capable of producing the infection.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			HOSPITAL ACQUIRED INFECTION Patients, staff nurses, doctors, ward aids, ward boys, patient attenders and all the other health care workers have an increased risk of getting infections from the hospitals. Clients in the health care settings are increasing the risk of infection. This can spread because of the use of invasive procedures, administration of antibiotics, presence of multi drug resistant organisms. **INFECTION CONTROL PRACTICES FOR POST OPERATIVE CARDIC PATIENTS** The understanding chain of infection is a vital role to prevent the infection to everyone. The individual should identify the signs and symptoms of infection and also to take an appropriate action to prevent the infection. • Hand washing • Personal protective equipments • Care of invasive lines • Prevention of ventilator associated pneumonia • Prevention of surgical site infections • Prevention of catheter associated urinary tract infection			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
2.	4 min	Explain about hand washing practices.	• Biomedical waste management **Hand washing** Hand hygiene practices should know all the health workers. Instruct all the health workers to follow hand hygiene practices before and after the procedure. **Equipments for hand washing** a) Antiseptic hand rubs b) Alcohol based water less c) Antiseptic containing emollient d) Hand washing e) Easy to reach sink with warm running water f) Antimicrobial or non antimicrobial soap g) Disposable nail cleaner **Classify the steps of hand washing** 1. Surgical hand washing 2. Medical hand washing	The teacher explained about hand washing practices.	Listening and observing	What are the moments of hand washing

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Steps of hand washing 1. Inspect your hand surface for break or cut in the skin or cuticles. Cover the hands if any skin lesions with a dressing before providing care to the patients. 2. Watch hands for visible soiling 3. Nails should be 1/4th inch from finger tip and smooth. Do not wear artificial nails. 4. Avoid wearing rings in to fingers and also push the wrist watch or long uniform sleeves above the wrist. **Antiseptic hand rub** 1. Apply the solution to palm of one hand. 2. Rub the hands together and also to cover all surface of hands, fingers with aseptic. 3. Until the alcohol is dry, rub the hands together for several seconds and also allow to dry before applying gloves **Hand washing using antiseptic soap** 1. Stand in front of sink and keep the hands, uniform way from the surface of sink.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			2. Turn on water and push the knee pedals laterally. 3. To avoid splashing of water against the uniform. 4. Temperature is warm, if regulates the flow of water. 5. Wet wrist and hands thoroughly under running water. 6. During washing should keep the hands and forearms lower than elbows. 7. Apply 3 to5 ml of antiseptic solution for wash. 8. Wash hands for at least 40 seconds. **Steps of hand washing** I. Interlace fingers II. Rub palms III. Back of hands with circular motion IV. Keep fingers down to facilitate removal of microorganisms. V. Finger nails to be clean VI. Rinse the hands and wrist thoroughly VII. Rinse hands and dry hands thoroughly VIII. Turn of water with foot and knee pedals.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Hand washing techniques includes 1. Alcohol hand rub should use before and after providing the care 2. Washing the hands with soap and water when they are visibly soiled. 3. A surgical scrub should be done before performing the procedure. Hand washing should be done with soap and water for 40 seconds based on WHO, 2009 Rubbing hands will remove the soil and transient flora from our hands and contaminated hands of health care workers will transmit the infections from one hand to other hands. 1. Hands should be free from the jewellery and other accessories 2. Contaminated hands of health care workers are the primary source of infection 3. Trim the nails properly 4. Dries the hands with paper towels 5. Ethyl alcohol and chlorhexidine to be used for hand washing (CDC 2009) 6. Hand washing will help to remove the transient flora.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Alcohol is an excellent germicidal agent to prevent the infection like soap and water(CDC AND WHO 2009) I. Wash the hands when hands are visibly soiled II. When hands soiled with blood or other body fluids, before eating, wash hand with soap and water and non anti microbial soap. III. If hands are not visibly soiled (WHO 2009), use an alcohol based solution for hand washing. IV. When moving from contaminated to clean body surface during patient care. V. After contact with an equipments in the patient room. VI. Before putting the sterile gloves and before doing the procedures. VII. After removing the glove **Moments of hand washing** a. Before touching a patient b. Before doing the procedure c. After a procedure or body fluid exposure d. After touching a patient e. After touching a patient surroundings			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Before touching a patient 1. Wash your hands before touching the patient 2. Health care workers should protect the patients against the harmful germs carried out on your hands. **Before clean or aseptic procedure** 1. Wash the hands immediately before doing the aseptic procedures. 2. Protect the patients against the harm full germs which is entering into the body. **After body fluid exposure** 1. Wash your hands before and after the exposure of body fluids. 2. To protect ourselves from the environmental contamination while doing hand washing. **After touching a patient** 1. Wash your hands after touching the patient and his environment when leaving him from the site. 2. To protect ourselves from harmful germs.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			After touching patient surroundings 1. Wash your hands after touching patients things or furniture's. 2. To protect ourselves from harmful germs from the surroundings. 3. Sleeves should be above the elbows. 4. **Steps of hand washing** 1. Rub the hands palm to palm 2. Right palm over the left dorsum with interlocked fingers. 3. Palm to palm with fingers inter locked 4. Back of fingers to opposing palms with fingers inter locked. 5. Rotational rubbing of right and left thumb 6. Rubbing backward and forward.			
3.	3 min	Discuss in detail about personal protective equipment	**PERSONAL PROTECTIVE EQUIPMENTS** Personal protective equipments were using by the health care workers for the protection against from the infectious materials. • Foot cover • Mask • Protective eye wear	The teacher discussed personal protective equipment	Listening and observing	How many types of personal protective equipment

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			• Gown • Gloves Should be used for performing patient care. (CDC2004). **Foot cover** Foot wears are the important material to prevent from the external infection. This will avoid the external contamination that easily transmitted through the shoes to restricted areas or operating rooms. All the health care workers must use foot wears for doing the procedure and also should discard after once use. This can prevent the serious bacterial and risk of cross infection. **Mask** Mask should wear full face protection with the nose and mouth covered. **Purpose of wearing mask** 1. This will prevent splashing or spraying the body fluids and blood into the face.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			2. Wear the mask when giving care to the airborne disease patients. 3. Wear mask, if the patient is affected with tuberculosis. 4. Mask will protect the health care workers from the inhalation of microorganisms and small droplet nuclei that remain suspended in the air from patient respiratory infections. 5. Never reuse the disposable mask 6. Keep talking minimum while wearing mask to prevent from respiratory infections. **Guidelines of wearing mask** a. Applying a sterile mask and gown should be properly trained by surgical technicians. b. Find the top of mask pliable metal fits and also snugly against the bridge of nose. c. Hold the mask by the top of two strings or loops. d. Secure to tip of tie at back of head with tie above the ears. e. Tie the two lower ties snugly around the neck with mask well under chin. f. Gently pinch the upper metal band around the bridge of the nose.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Eye protection **Purpose of wearing eye protection** a. Use special glasses or goggles prevent the splashes. Use goggles when the insertion of central line catheters or arterial lines. b. Needs to be fit around the face, so that he fluids cannot enter in to the face or mouth. **Gown** **Purpose of wearing gowns** Gown is to prevent the contamination of clothes while during the patient care. This will cover to protect the health care workers and visitors from infected material and body fluids. 1. Change the gown if it is damaged 2. Dispose the isolation gown after once used 3. Isolation gowns should open at the back and have ties or snaps at the neck and waist to keep the gown closed and secure. **Gloves** Gloves are using for prevention and also minimizing the risk of			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			introducing harmful microorganisms into the sterile areas of the body while undertaking the clinical procedures. **Purpose and guidelines of wearing gloves** 1. Gloves do not change the practice of optimal hand hygiene. 2. Before donning the gloves, hands should be dry. 3. Gloves prevent the indirect and direct contact. 4. Gloves should not wash or disinfect for reuse. 5. Always should change the gloves after patient contact. **When to don gloves** **A.** Before touching wet **B.** If broken skin **C.** Mucous membranous **D.** Blood and body fluids **E.** Invasive procedures **F.** Contaminated waste **G.** Soiled instruments			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Removal of gloves a) Remove after the use b) Before contaminated touching items c) Before going to another patients d) Perform hand hygiene to avoid transfer e) If notice tear of gloves			
4.	3min	Describe the care of invasive lines	**PREVENTION OF INVASIVE LINE INFECTION** Invasive line infections will increase the cost of hospital as well as the length of hospital stay. This will increase the mortality rate. Around 250,000 of people have been occurred annually. **Peripheral lines** Peripheral line mostly referred to as drips because of the air entering into the blood stream. It is used to administer the antibiotics. Bioavailability of medication is 100% through the intravenous therapy. • Peripheral lines should change after 72 hours • Flushing of intravenous line should be done before and after administering the medications.	The teacher described about the invasive lines	Listening and observing	How to prevent invasive line infection

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			• Assess the patency of cannula. • Disinfects the external surface of the catheter hub before giving the medications • Replace the intravenous tubing's after 24 hours. **Central venous lines** Central venous therapy is used to correct the electrolyte imbalance, administration of ionotrops, for the blood transfusion. The main purpose is to assess the central venous pressure and pulmonary arterial pressure • Use sterile gauze or sterile transparent semi permeable • Dressing to cover the catheter site. • Should replace the catheter, if the dressing becomes loosened, damp or visibly soiled. • To promote fungal infections, do not use topical antibiotic ointment or creams on insertion site. • Replace the transparent dressings from the central venous catheter after one week. • Use a chlorhexidine impregnated sponge dressing for temporary shorter catheters.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			• Chlorehexidine should be used as skin antiseptics • Catheter removal site should be checked for the presence of erythema, swelling, tenderness, and palpable venous thrombosis. • Presence of Blood or antimicrobial ointment should be removed from the skin around the catheter site. • Use 2% of chlorhexidine wash for daily skin cleaning to reduce the infection • Sutureless securement device should be used for reducing the risk of infection from intra vascular catheters. **Systemic antibiotic prophylaxis** Do not administer the antibiotic prophylaxis routinely before the insertion of catheters or during the use of an intravascular catheter to prevent catheter colonization. **Antibiotic/ antiseptic ointments** • After the insertion of the catheters should use povidine iodine antiseptic ointment or bacitracin/ gramicidine polymyxin-B ointment at the hemodialysis catheter.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
5.	4 min	Explain the nursing care measures of ventilator associated pneumonia.	• Wear the mask, cap, gown while handling central venous catheter. • Replace the intravenous tubing's within 24 hours of initiating the infusion. **PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA** In an intensive care unit, ventilator associated pneumonia is having the high rate of mortality and morbidity. Ventilator bundle is one of the series interventions which is related to ventilator care. • To decrease the bacterial site endotracheal colonization, antimicrobial coated to be done. • Heat moisture exchange should change every 24- 48 hours • Pneumatic circuit should change every 24-48 hours • Use single use catheter for suctioning • Oxygen mask, ventilator device,nebulizer chambers are cleaned carefully and alsoshould sterilized. • Humidifier domes are sterilized; AMBU bags are cleaned thoroughly and then send for the sterilization. • Microbial survillence of respiratory equipments should be practiced. • Sterile water should be used for the nebulizers and humidifiers and	The teacher explained the nursing care measures of ventilator associated pneumonia.	Listening and observing	What are the nursing care measures of ventilator associated pneumonia

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			also should changed every one or twice daily. **CARE OF PATIENT WITH VENTILATOR** Mechanical ventilator can maintain ventilation automatically for prolonged time. This is indicated in patient who is unable to maintain the safe level of oxygen and the level of carbon dioxide by spontaneous breathing even in an assistance ➢ Head to foot care to be given ➢ Oral care should be given with chlorhexidine. ➢ Head end to be elevated to every 30-40 degree will prevent aspiration. ➢ Stress ulcer prophylaxis to be given. ➢ Readily sedation vacation and assessment of readiness to extubate. ➢ Identify the malnourished peoples. ➢ Stress ulcer includes H2 blockers, sucralfate versus ranitidine. ➢ Patient who have mechanichal ventilator showed a significant reduction in clinically important GI bleeding.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
6.	3 min	State the preventive measures of surgical site infection	**PREVENTION OF SURGICAL SITE INFECTION** Surgical site infection is a type of hospital acquired infection which mainly affect post operative patients. The causes of infection are from virus, bacteria, fungus, methicillin resistant staphylococcus aureus infections and also it is affecting through the intravascular catheters. This is affecting up to 20% of all health care related individuals. 1. Identify and treat remote site infection 2. Adequately control glucose in diabetes 3. Surgical wounds after an elective surgery are inspected on 3rd post operative day. 4. Follow aseptic techniques while changing the dressings. 5. All personnel doing dressing should wash their hands before doing the procedure. Follow the 2 methods • One to open the wound • One to do the dressing ➢ Wash hands before applying the dressing ➢ Dressing should be done daily by using povidine iodine to clean the	The teacher explained the preventive measures of surgical site infection	Listening and observing	How to prevent the surgical site infection.

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			wound and applying dry absorbent dressing if there is any evidence of infection. ➢ Administer antimicrobial agents as prescribed **PROPHYLACTIC ANTIBIOTICS** Most of the surgical patients is needed the treatment of prophylactic antibiotics. The risk factors of patients are suggesting the need of prophylactic antibiotics such as certain valvular diseases and immunosuppression I. Antibiotics given for the purpose of preventing the infection. Cefazolin is widely used for clean operations. II. Appropriate use of antibiotics one hour before insertion should be given.			
7.	2 min	Recognizing the preventive measures of urinary catheter	**PREVENTION OF URINARY CATHETER INFECTIONS** The person who knows the correct technique of aseptic and maintenance of catheters should handle catheters. Most of the hospitals are facing the challenge to prevent the catheter associated urinary tract infection.	The teacher recognized the preventive	Listening and observing	What are the prevention of urinary tract

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
		infection.	Around 50% of hospitals are not following the guidelines to prevent the catheter associated infection. **Guidelines to prevent the urinary tract infection.** • Urinary catheters should be inserted only if necessary • Hand washing should be done before after touching the catheter • Catheter should be used to insert with the aseptic techniques. • Catheter should be changed after the 6^{th} day of insertion. • Empty the urobag $3/4^{th}$ fully. • Secure the catheters to the lower abdominal wall for male patients. • Encourage to drink water if not contraindicated. • Keep the collection bag below the level of the bladder at all times. • Maintain unobstructed urine flow. • Empty the collection bag regularly using a separate collecting container from each patient and avoid allowing the draining spigot to touch the container.	measures of urinary catheter infection.		infection.
8.	4 min	Discuss about biomedical waste	**BIOMEDICAL WASTE MANAGEMENT** Biomedical waste will be solid waste or liquid waste. It is originating from	The teacher discussed	Listening and observing	What are the colour

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
		management	the laboratories or by the use of human beings. It is containing biomolecules or organisms that are restricted from the environmental relief. **purpose** ✓ To prevent the infection by maintaining good hygiene and sanitation. ✓ Protect the patient from the infection. ✓ Prevent from the environmental pollution ✓ To minimize the waste. **Waste disposal** A red plastic bag placed in the patients room for collecting the infectious waste. Empty the waste disposal bag when it is 3/4th filled Non infectious waste does not require special precautions to prevent the infection. **Colour codes** **Green** **(general waste)-**paper, food waste	about biomedical waste management		coding of biomedical waste management

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Yellow (infectious)-human tissues, organs, body parts, microbiology, biotechnology waste, items contaminated with blood and body fluids **Red plastic**- all types of intravenous and other tubings catheters, disposal syringes, blood bags, gloves, dialysis, all kinds of drains and aprons. **Blue –** glass waste, unbroken bottles, ampoules. **Sharp container-** needles, sharp like scalps, clinical and pathological slides. **SAFE NEEDLE HANDLING PRACTICES** • Do not recapping the needle. • Needle left unattended. • Discard sharps in bags other than sharp container. • Overflowing sharps container should be avoided • Do not Bend or break the needles. • Do not transfer sharps from one person to another. • Use 1% of sodium hypochlorite for the container. **Do's to prevent the needle stick injury.** ✓ Sharp container should be available at the procedure site. ✓ Dispose the sharps immediately in to the container			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			✓ Do not reuse the needle handling of used should be thick rubber gloves ✓ Remove the needle with care using a forceps or a clamp. ✓ Empty the sharps container when it 3/4th filled **Don'ts to prevent the needle stick injury.** • Do not recap the needle. • Do not break or bend the needle • Do not allow the sharps to cover flow • Do not directly transfer the sharps to other person without using of k-basin. • Do not ask another person to hold the hand while doing a phlebotomy instead using a tourniquet. • Most common infection is hepatitis-B. **BIBILIOGRAPHY** 1. Potter and perry's (2013) fundamentals of nursing. 9th edition. Elseivier publications. Page no: 335- 359 2. Carol taylor and carol lillis, Priscilla lemone (2005) fundamentals of			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			nursing. 6th edition. Wolter publications. Page no: 701- 725 3. Linda.S.Williams, Paula.D.Hopper (2012). Medical surgical nursing. 4th edition. Jaypee publications. Page no: 1103-1114 4. Ignatavicius, Workman (2013) medical surgical nursing. 7th edition. Elsevier publications. Page no: 338-350. 5. Susan C Devit (2010) fundamental concepts and skills for nursing. 3rd edition. Elsevier publications. Page no: 232-236 6. Barbara kozier, Glenora Erh , Audrey Berman Karen Barke.(2007) fundamentals of nursing. 7th edition. Page no: 667-672. **Net Reference:** 1. www.Pubmed.com 2. www.infectioncontrol.CDC. com 3. www.WHO.Infection control.com			

Subject : Infection control

Topic : Hand washing techniques and personal protective equipments

Group : Staff Nurses

Place : MMM Hospital

Date : 15/5/15

Time : 10.30 am

Teaching methods : Demonstration

Name of student : Stiji Samuel

Central objectives

The demonstration will help the group to gain knowledge regarding hand washing and personal protective equipments develop positive attitude in practicing the same.

Specific objectives

At the end of the demonstration, the staff will be able to

1. State the meaning of personal protective equipments
2. Classification of hand washing
3. Enumerate the steps of hand washing
4. Demonstrate the steps of wearing mask
5. Enlist the article regimens for gowning
6. Demonstrate the steps of gowning
7. Demonstrate the steps of gloving

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
1.	3 min	Staff will be able to state the personal protective equipments	**PERSONAL PROTECTIVE EQIPMENTS** Personal protective equipments is using by health care workers to prevent the infection. (gown, mask or respirators, protective eye glasses, gloves) **Hand washing** Hand hygiene practices should know all the health workers. Instruct all the health workers to follow hand hygiene practices before and after the procedure. **Equipments for hand washing** a) Antiseptic hand rubs b) Alcohol based water less c) Antiseptic containing emollient d) Hand washing e) Easy to reach sink with warm running	The teacher explained about personal protective equipments	Listening	What is the need of personal protective equipment

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			water f) Antimicrobial or non antimicrobial soap g) Disposable nail cleaner			
2.	3 min	Classification of hand washing	**Classify the steps of hand washing** 1. Surgical hand washing 2. Medical hand washing	The teacher listed down the classification	Demonstration	Demonstration
3.	5 min	Enumerate the steps of hand washing	**Steps of hand washing** 1. Inspect your hand surface for break or cut in the skin or cuticles. Cover the hands if any skin lesions with a dressing before providing care to the patients. 2. Watch hands for visible soiling 3. Nails should be 1/4th inch from finger tip and smooth. Do not wear artificial	The teacher explained about the steps of hand washing	Listening	Demonstrate the steps of hand washing

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			nails. 4. Avoid wearing rings in to fingers and also push the wrist watch or long uniform sleeves above the wrist. **Antiseptic hand rub** 1. Apply the solution to palm of one hand. 2. Rub the hands together and also to cover all surface of hands, fingers with aseptic. 3. Until the alcohol is dry, rub the hands together for several seconds and also allow to dry before applying gloves **Hand washing using antiseptic soap** 1. Stand in front of sink and keep the hands, uniform way from the surface of sink. 2. Turn on water and push the knee pedals			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			laterally. 3. To avoid splashing of water against the uniform. 4. Temperature is warm, if regulates the flow of water. 5. Wet wrist and hands thoroughly under running water. 6. During washing should keep the hands and forearms lower than elbows. 7. Apply 3 to5 ml of antiseptic solution for wash. 8. Wash hands for at least 40 seconds. I. Interlace fingers II. Rub palms III. Back of hands with circular motion IV. Keep fingers down to facilitate removal of microorganisms. V. Finger nails to be clean			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			VI. Rinse the hands and wrist thoroughly VII. Rinse hands and dry hands thoroughly VIII. Turn of water with foot and knee pedals.			
4.	3 min	Demonstrate the steps of wearing mask	**MASK** a. Applying a sterile mask and gown should be properly trained by surgical technicians. b. Find the top of mask pliable metal fits and also snugly against the bridge of nose. c. Hold the mask by the top of two strings or loops. d. Secure to tip of tie at back of head with tie above the ears. e. Tie the two lower ties snugly around	The teacher explained about mask The teacher	Listening and observing	Demonstrate to wear mask

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			the neck with mask well under chin. f. Gently pinch the upper metal band around the bridge of the nose.			
5.	5 min	Enlist the article regimen for gowning	**GOWNING** A sterile gown and closed gowning should be trained by the surgical technicians. **EQUIPMENTS** a. Proper size sterile gloves b. Sterile pack containing sterile gown c. Clean, flat, dry surface. d. Paper face masks, cap, or hood surgical shoe covers e. Protective eye wears or face shields.	enlisted the article regimen for gowning	Observing	List down the articles of gowning
6.	6 min	Demonstrate the steps of gowning	**Procedure** 1. Before entering in to the surgical room the person should wear cap, face mask,	The teacher demonstrated the steps of gowning	Observing and listening	Demonstrate the steps of gowning

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			eye wear, and foot wear. 2. Thorough surgical wash should be performed. 3. For keeping the inner content sterile, the circulatory nurse should wear gloves for peeling of wrapper open. 4. Reach down to sterile gown package 5. Lift the folded gown pack directly upward and step back away from the table. 6. Holding folded gown and locate the neck band with the hands grasp inside front of gown just below of neck band. 7. The person should not touch outside of gown with bare hands. 8. Circulatory nurse should tie the back of gown at neck and waist.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			Closed gowning a) Open inner sterile gloves package with the hands covered by gown sleeves. b) Pick up glove for non dominant hand by grasping folded cuff , when the dominant hand inside the gown cuff c) Place palm of glove against the palm of dominant hand and extend non dominant forearm with palm up. Gloves fingers point towards elbow d) With covered dominant hand to grasp back of glove cuff and turn gown cuff. e) Being sure that the glove cuff covers gown cuff. f) Glove dominant hand in same manner, reversing hands. Use gloved dominant hand to pull on glove. Keep the hands inside the sleeve.			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
7.	5 min	Demonstrate the steps of gloving	**GLOVING** 1. The skill of open glove should be trained by the surgical technicians. 2. All should perform thorough hand washing 3. Remove the outer cover of glove carefully and peeling it a part sides. 4. Open the package and to keep the gloves on wrapper inside surface. 5. Make sure that the fingers are fully extended into both gloves. 6. Take gloved hand for wrap around the gown and to release ties in front of the gown. 7. Circulatory nurse help the person to cover the back with sterile gown, she should take hand paper tab connected to sterile tie and allowing for margin of safety as gown wrap around and cover	The teacher demonstrated the steps of gloving.	Observing	Demonstrate the steps of gloving

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			the back. 8. The person should identify the right and left gloves and each glove should be 5cm wide. 9. Wear the glove with thumb and first two fingers of dominant hand; grasp the edge of cuff of glove for using dominant hand. 10. The person should touch only inside surface of glove. 11. We should carefully pull the glove over the dominant hands and also being sure that does not roll up the wrist. We should make sure that the thump and fingers are in proper space. 12. We should wear with gloved dominant and hand slip fingers underneath the cuff of second glove. 13. We should carefully wear second glove			

Sl.No.	Time	Specific objectives	Content	Teaching activity	Learning activity	Evaluation
			over non dominant hand and do not allow the fingers to touch the unsterile area. **BIBILIOGRAPHY** 1. Potter and Perry's (2013). Fundamentals of nursing. 9th edition. Elsevier publications. Page no: 335-359 **2.** Carol Taylor. Fundamentals of nursing. 6th edition. Wolters publications. Page no: 701-725.			

APPENDIX – F

LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY

From

STIJI SAMUEL
M.Sc(N) I year
MMM College of Nursing
131,Sakthi Nagar, Mugapair West,
Nolambur
Chennai 600091.

To

Respected Madam / Sir,

Sub: Requisition for expert opinion on suggestion for content validity of the Assessment and intervention tool.

This is to bring to your kind notice that I am a student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu.

I am planning to conduct **" A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**

Herewith I am sending the

1. Intervention protocol.
2. Tool for assessing knowledge and practice of infection control

Kindly validate the tool and render your expert opinion in this regard. I am thankful to you for spending your valuable time for the validation of this tool. It will be very kind of you to return it to the undersigned at the earliest.

Thanking you,

Yours Sincerely,

STIJI SAMUEL

Enclosures:

1. Statement and objectives of the study.
2. Intervention protocol.
3. Tool for assessing knowledge and practice of infection control.
4. Validity Certificate

LIST OF EXPERTS FOR CONTENT VALIDITY

1. **Dr.Jaya Raju,**
   Medical Superintendent
   The Madras Medical Mission, Chennai.

2. **Dr. Anusha**
   HOD of Microbiology
   The Madras Medical Mission, Chennai.

3. **Mrs. Annamma Jacob**
   Associate professor
   Josco college of nursing
   Edappon, pandalam, Kerala

4. **Mrs. Rency Jose**
   Associate Professor
   St. Thomas College of Nursing
   Chethipuzha, Chaganacherry, Kerala.

5. **Sister. Teresenze**
   Associate Professor
   Pushpagiri College of Nursing,
   Thiruvalla, Kerala.

CONTENT VALIDITY CERTIFICATE

This is to certify that , **MS. STIJI SAMUEL** student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu her data collection tool on the topic , **"A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**is validated and suggested the necessary changes to execute.

Signature of the expert

Date:

Place:

Designation and Address

Dr. J. JAYARAJU, MBBS, DCP, CCMM
Regn. No.: 52299
Medical Superintendent
The Madras Medical Mission
No.4-A, Dr. J.J. Nagar, Mogappair East,
Chennai - 600 037.

CONTENT VALIDITY CERTIFICATE

This is to certify that , **MS. STIJI SAMUEL** student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu her data collection tool on the topic , **"A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**is validated and suggested the necessary changes to execute.

Signature of the expert

Date: 12/2/15

Place:

Designation and Address

DR. ANUSHA ROHIT, MD (MICRO)
HOD, DEPT. OF MICROBIOLOGY
The Madras Medical Mission
4-A, Dr. J.J. Nagar, Mogappair,
Chennai-600 037, India.

CONTENT VALIDITY CERTIFICATE

This is to certify that, **MS. STIJI SAMUEL** student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu her data collection tool on the topic , **"A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**is validated and suggested the necessary changes to execute.

Annamma Jacob

Signature of the expert

Date:

Place:

JOSCO COLLEGE OF NURSING EDAPPON JOSCO JN PANDALAM

Designation and Address

Associate Professor
Josco College of Nsg
Edappon, Pandalam
Kerala State.

CONTENT VALIDITY CERTIFICATE

This is to certify that, **MS. STIJI SAMUEL** student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu her data collection tool on the topic , **"A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**is validated and suggested the necessary changes to execute.

ST. THOMAS COLLEGE OF NURSING * CHANGANACHERRY * KURISUMMOODU P.O. * CHETHIPUZHA *

Reny Jose

Signature of the expert

Reny Jose
Associate Professor

Designation and Address

St. Thomas College of Nursing
Chethipuzha

Date: 3/3/15

Place: Chethipuzha.

CONTENT VALIDITY CERTIFICATE

This is to certify that, **MS. STIJI SAMUEL** student studying M.Sc(Nursing) I year at MMM College of Nursing, Chennai -91, affiliated to Dr.MGR.Medical University, Tamil Nadu her data collection tool on the topic , **"A true experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control of post operative cardiac patients among staff nurses at a selected setting in Chennai."**is validated and suggested the necessary changes to execute.

Signature of the expert

HOD + Assoc. Professor
Medical Surgical Nursing
Pushpagiri college of Nursing

Designation and Address

Tiruvalla - 689101
Pathanamthitta.
Kerala State.

Date: 01/04/15

Place: Tiruvalla.

PUSHPAGIRI COLLEGE OF NURSING
KERALA STATE
INDIA
TIRUVALLA - 689 101

APPENDIX –G

CERTIFICATE OF ENGLISH EDITING

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation work " **A Pre-experimental study to assess the effectiveness of planned teaching programme on knowledge and practice regarding infection control measures for post operative cardiac patients among staff nurses at selected hospital in Chennai**." Done by Ms. Stiji Samuel II year M.Sc Nursing in MMM college of nursing, Chennai is edited for English language appropriateness by

...Fr. Moncy Kaleeckal MA MEd

SACRED HEART MATRIC. HIGHER SECONDARY SCHOOL
MARIA NAGAR, PADI,
CHENNAI - 600 050.

21/12/15

Signature

FR. MONCY KALEECKAL M.A., M.Ed.,
PRINCIPAL
SACRED HEART MATRIC. HIGHER SECONDARY SCHOOL
MARIA NAGAR, PADI, CHENNAI - 600 050.

APPENDIX – H

PLAGIARISM REPORT

Plagiarism Detector - Originality Report:

"STIJI SAMUEL.docx"

Core version:	**895**
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Registered to:	**DR. ROSALINE RACHEL**
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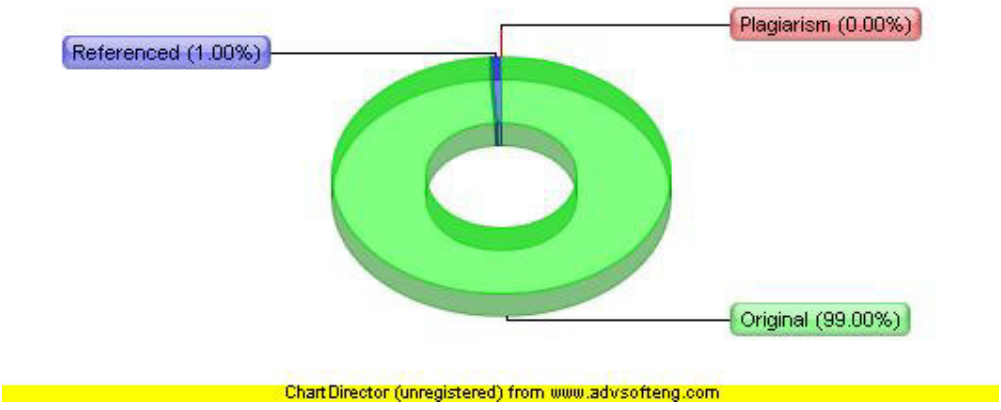
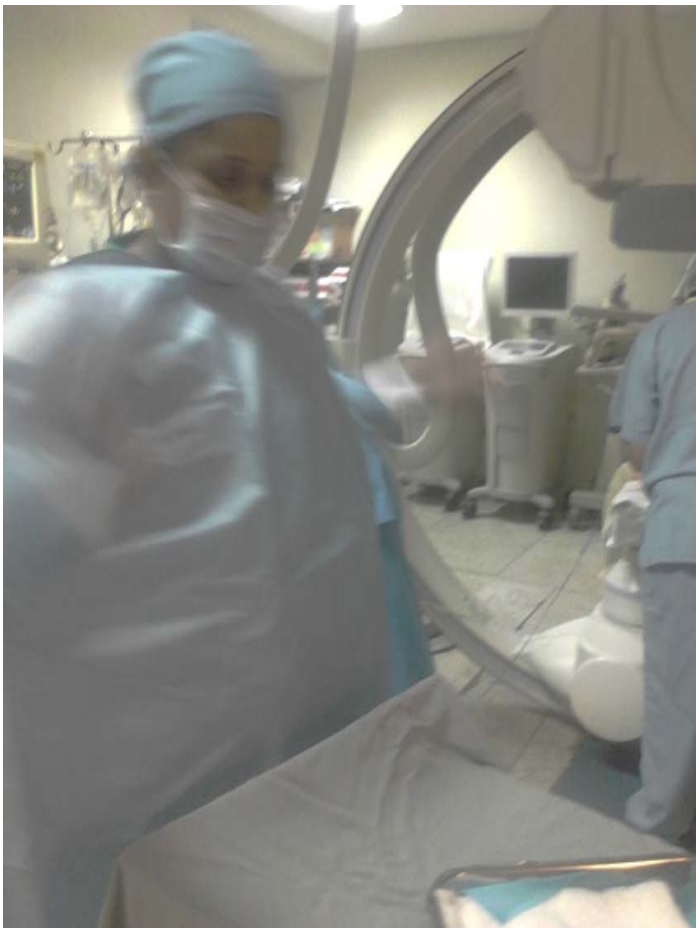


APPENDIX – I

PHOTOGRAPHS

DEMONSTRATION ON HANDWASHING AND PERSONAL PROTECTIVE EQUIPMENTS



EXHIBITION ON BIO-MEDICAL WASTE DISPOSAL AND PERSONAL PROTECTIVE EQUIPMENTS